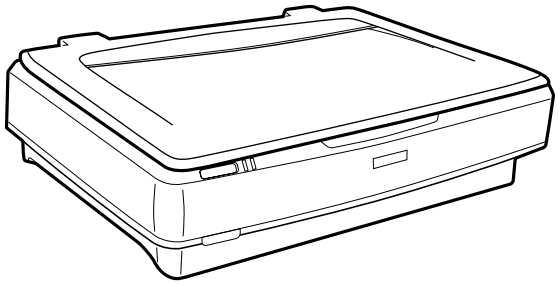
SERVICE MANUAL



Color Flatbed Scanner

EPSON Expression 10000XL

EPSON

SESC04-001

Notice:

- All rights reserved. No part of this manual may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SEIKO EPSON CORPORATION.
- The contents of this manual are subject to change without notice.
- All effort have been made to ensure the accuracy of the contents of this manual. However, should any errors be detected, SEIKO EPSON would greatly appreciate being informed of them.
- The above not withstanding SEIKO EPSON CORPORATION can assume no responsibility for any errors in this manual or the consequences thereof.

EPSON is a registered trademark of SEIKO EPSON CORPORATION.

General Notice: Other product names used herein are for identification purpose only and may be trademarks or registered trademarks of their respective owners. EPSON disclaims any and all rights in those marks.

Copyright © **2004** **SEIKO EPSON CORPORATION.**
I & I CS Quality Promotion Department (PTSG)

PRECAUTIONS

Precautionary notations throughout the text are categorized relative to 1)Personal injury and 2) damage to equipment.

DANGER Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by DANGER Headings.

WARNING Signals a precaution which, if ignored, could result in damage to equipment.

The precautionary measures itemized below should always be observed when performing repair/maintenance procedures.

DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES.
2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.
3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL, DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.
4. WHEN DISASSEMBLING OR ASSEMBLING A PRODUCT, MAKE SURE TO WEAR GLOVES TO AVOID INJURIER FROM METAL PARTS WITH SHARP EDGES.

WARNING

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGES IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.
3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.
4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICs OR OTHER NON-APPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

About This Manual

This manual describes basic functions, theory of electrical and mechanical operations, maintenance and repair procedures of the printer. The instructions and procedures included herein are intended for the experienced repair technicians, and attention should be given to the precautions on the preceding page.

Manual Configuration

This manual consists of six chapters and Appendix.

CHAPTER 1.PRODUCT DESCRIPTIONS
Provides a general overview and specifications of the product.

CHAPTER 2.OPERATING PRINCIPLES
Describes the theory of electrical and mechanical operations of the product.

CHAPTER 3.TROUBLESHOOTING
Describes the step-by-step procedures for the troubleshooting.

CHAPTER 4.DISASSEMBLY / ASSEMBLY
Describes the step-by-step procedures for disassembling and assembling the product.

CHAPTER 5.ADJUSTMENT
Provides Epson-approved methods for adjustment.

CHAPTER 6.MAINTENANCE
Provides preventive maintenance procedures and the lists of Epson-approved lubricants and adhesives required for servicing the product.

APPENDIX Provides the following additional information for reference:

- Connector pin assignments
- Electric circuit boards components layout
- Electrical circuit boards schematics
- Exploded diagram
- Parts List

Symbols Used in this Manual

Various symbols are used throughout this manual either to provide additional information on a specific topic or to warn of possible danger present during a procedure or an action. Be aware of all symbols when they are used, and always read NOTE, CAUTION, or WARNING messages.

Indicates an operating or maintenance procedure, practice or condition that is necessary to keep the product's quality.

Indicates an operating or maintenance procedure, practice, or condition that, if not strictly observed, could result in damage to, or destruction of, equipment.

May indicate an operating or maintenance procedure, practice or condition that is necessary to accomplish a task efficiently. It may also provide additional information that is related to a specific subject, or comment on the results achieved through a previous action.

Indicates an operating or maintenance procedure, practice or condition that, if not strictly observed, could result in injury or loss of life.

Indicates that a particular task must be carried out according to a certain standard after disassembly and before re-assembly, otherwise the quality of the components in question may be adversely affected.

Revision Status

Revision	Date of Issue	Description
A	May 14, 2004	First Release

Contents

Chapter 1 PRODUCT DESCRIPTION

1.1 Product Features 9
1.1.1 Product Features 9
1.1.2 TPU Product Features 10
1.2 Basic Specifications 10
1.2.1 General Specifications 10
1.2.2 General TPU Specifications 11
1.2.3 Detail Specifications 11
1.2.3.1 Firmware, Software 11
1.2.4 Electrical Performance 12
1.2.5 Compliant Standards 12
1.2.6 Electrical Noise Resistance 13
1.2.7 Environmental Conditions 13
1.2.8 Reliability 13
1.2.9 Operating Conditions 13
1.2.10 Document Conditions 13
1.2.11 Size and Weight 14
1.3 Interface Specifications 15
1.3.1 Overview 15
1.3.2 IEEE1394 15
1.3.3 USB2.0 15
1.3.4 Multi Interface Compatibility 15
1.3.5 Control Code List 15
1.4 Operational Specifications 16
1.4.1 Operation Switches 16
1.4.2 Document Scanning Area 17
1.4.3 Displays Specifications 18
1.4.4 Carriage Lock 18
1.5 Error Handling 19

Chapter 2 OPERATING PRINCIPLES

2.1 Overview 21
2.2 Mechanism Operation Overview 22
2.2.1 Carriage Drive System Mechanism 22
2.2.2 TPU Carriage Movement Mechanism 22
2.2.3 Carriage Optical System Mechanism 23
2.3 Electrical Circuit Operation Overview 23
2.3.1 Control Circuit Operation 23

Chapter 3 TROUBLE SHOOTING

3.1 Overview 26
3.1.1 Self-Diagnostic Function 26
3.2 Action on Troubles 27

Chapter 4 DISASSEMBLY/ASSEMBLY

4.1 Overview 33
4.1.1 Precautions 33
4.1.2 Recommended Tools 34
4.1.3 Screws Used in Disassembly and Reassembly 35
4.2 Disassembly Procedure 36
4.2.1 Removal of Document Cover 37
4.2.2 Removal of Hinges 37
4.2.3 Removal of Housing Upper 38
4.2.4 Removal of Power Supply Board 39
4.2.5 Removal of Main Board 42
4.2.6 Removal of Carriage Unit and Carriage Shaft A/B 44
4.2.7 Removal of Fan 46
4.2.8 Removal of Power Switch 47
4.2.9 Removal of Panel Board 48
4.2.10 Removal of HP Tension Unit/CR Motor 48
4.2.11 Removal of Open/Close Sensor Unit 50

4.2.12 Disassembly of TPU 52
4.2.12.1 Removal of TPU Lower Housing 52
4.2.12.2 Removal of TPU Carriage Lock 53
4.2.12.3 Removal of TPU Main Board 53
4.2.12.4 Removal of OPTION I/F Connector Cable 55
4.2.12.5 Removal of TPU CR Motor Belt/TPU CR Motor 55
4.2.12.6 Removal of TPU Carriage Unit 57
4.2.12.7 Removal of TPU Inverter Board/Lamp 59
4.2.12.8 Removal of TPU CR Belt 60
4.2.12.9 Removal of Hinges 61

Chapter 5 ADJUSTMENT

5.1 Overview 65
5.1.1 Required Files 65
5.1.2 Update Procedure 65
5.1.2.1 Supported OS 65
5.1.2.2 Supported I/F 65
5.1.2.3 How to Install F/W Updater 65
5.1.3 Instruction for F/W Updater 66
5.1.3.1 Preparation 66
5.1.3.2 How to Use F/W Updater 66

Chapter 6 MAINTENANCE

6.1 Overview 68
6.1.1 Cleaning 68
6.1.2 Lubrication 69

Chapter 7 APPENDIX

7.1 Connector Connection 71
7.1.1 Connector Layout 71
7.2 Circuit Diagrams 73
7.3 Exploded Diagrams 83
7.4 Parts List 89

CHAPTER

1

PRODUCT DESCRIPTION

1.1 Product Features

1.1.1 Product Features

This ES-10000G is a fast A3 color image scanner optimum for business/office applications. The main features are given below.

- ☐ High image quality
  - ■ Resolution : 2400 x 4800 dpi (Micro-step drive)
  - ■ Pixel Depth : 16-bit input, 16-bit output
  - ■ Maximum OD value : 3.8D
  - ■ Focus control : Auto focus by right-angle mirror motion

- ☐ Wide scan area
  - ■ Document tray scan : 12.2 x 17.2 inch (310 x 437mm)
  - ■ ADF scan : 11.7 x 17.0 inch (297 x 432mm)
  - ■ TPU scan : 12.2 x 16.5 inch (309 x 420mm)

- ☐ Fast scan
  - ■ 1200 dpi scan mode

Line Art	About 2.7msec/line
256 levels of Grayscale	about 2.7msec/line
Color	About8.0msec/line

  - ■ 2400dpi scan mode

Line Art	About5.3msec/line
256 levels of Grayscale	About5.3msec/line
Color	About16.0msec/line

  - ■ Transparent document scan mode

Positive film	Approx. 16.0msec/line
Negative film	Approx. 16.0msec/line

- ☐ Support of scan navigation button
  - ■ Scan start (for network connection)
  - ■ Scanner application software start (for local connection)

- ☐ A wide variety of interfaces
  - ■ Standard

    USB 2.0 (HS)

    IEEE1394 (6pin)
  - ■ Option

    Extended slot (supported ID = 0, 1: E Supported)

- ☐ Command level
  - ■ ESC/I-B8
  - ■ FS

- ☐ Option:
  - ■ ADF (Same ADF as used with ES-7000H)
  - ■ TPU
  - ■ N/W card

1.1.2 TPU Product Features

The following provides the main features of the ES-10000G own transparent document unit.

- Document size: Max. 309 x 420mm (12.2inch x 16.5inch)
- Xenon fluorescent lamps specifically used for positive and negative films, respectively
- Reflective documents can also be scanned with the transparent document unit attached
- Easily detachable/attachable document mat
- Hinges in easily detachable/attachable floating system and achieving a free stop of the TPU unit
- Ultra-thin design
- Four dedicated film holders supplied
  - 35mm strip film holder
  - 35mm slide film holder
  - 4 x 5 inch film holder
  - Brownie film holder

1.2 Basic Specifications

1.2.1 General Specifications

- Type : Desktop A3 flat-bed color image scanner
- Scanning system : Carriage moving type document scanning system
- Sensor : Alternative 6-line color CCD line sensor
- Document size : A3
- Maximum effective pixels : 29,280 (main) x 41,280 (sub) pixels (2400dpi)
- Maximum effective area
  - Document tray scan : 12.2 x 17.2 inches (310 x 437mm)
  - ADF scan : 11.7 x 17.0 inches (297 x 432mm)
  - TPU scan : 12.2 x 16.5 inches (309 x 420mm)
- Scanning resolution : Main 2400dpi
  Sub 4800dpi (micro-step drive)
- Output resolution : 50 - 12800dpi (1 dpi step)
  (12800 dpi is achieved by 6400 dpi x 200%)
- Pixel Depth : 16-bit input for each pixel/each color
  1 to 16 bit output
- Focus control : Auto focus by right-angle mirror control
  (-2mm to +6mm) Manual setting enabled
- Scanning speed
  - 1200 dpi scan mode

Line Art	About 2.7msec/line
256 levels of Grayscale	About 2.7msec/line
Color	About8.0msec/line

■ 2400dpi scan mode

Line Art	About5.3msec/line
256 levels of Grayscale	About 5.3 msec/line
Color	About 16.0 msec/line

■ Transparent document scan mode

Positive film	About 16.0 msec/line
Negative film	About 16.0 msec/line

☐ Interfaces :

■ USB2.0(1 pc.)

■ IEEE1394 serial bus interface (1 pc.)

■ Extended slot (supported ID = 0, 1: E Supported)

☐ Light source : High-intensity xenon fluor lamp

☐ Switch :

■ OPERATE SW

■ Scan Navigation SW

☐ Indication : LED red, green

☐ Option

■ Auto document feeder (ADF)

■ TPU

■ N/W card

☐ Noise : 45dB or less (TPU is also operating)

1.2.2 General TPU Specifications

☐ System : Light source-moving, document-fixed scanning system

☐ Light source : High-intensity xenon fluorescent lamp for positive film and high-intensity xenon fluorescent lamp for negative film

☐ Document size : Max. 309 x 420mm (12.2 x 16.5 inches)

☐ Color separation : Color separation by color CCD

☐ Sub scanning step: 4800dpi(micro-step driver)

1.2.3 Detail Specifications

1.2.3.1 Firmware, Software

☐ Command level : ESC/I command (B8 level)
FS command

☐ Image processing functions

■ Zoom : 50 to 200% (can be set in 1% increments)

■ Gamma correction

Output-by-output correction : 5 type as standard
2 types for CRT (A,B)
3 types for printer (A,B,C)
User-defined correction table can be set (1 type)

■ Color correction

Output-by-output correction : 4 type as standard
Wire dot printer
Thermal printer
Ink jet printer
Color monitor (CRT)
User-defined correction can be set (1 type)

Lightness correction : 7 levels

■ Image processing

Binary output : Fixed threshold value simple binary output, TET processing

Halftone processing output : 2-state, 4-state output
3 average error-minimized halftone types (A,B,C)
4 dither types (A,B,C,D)
2 user-defined dither types (A,B)

Area separation processing (AAS)

☐ Compatible OS

■ Windows

[USB1.1] Windows 98/Me/2000 Professional/XP Home Edition, Professional

[USB2.0] Windows 2000 Professional/XP Home Edition, Professional

[IEEE1394] Windows 2000 Professional/XP Home Edition, Professional

■ Macintosh

[USB1.1] Mac OS 9.1, Mac OS X 10.2 or later (10.0-10.1 are not supported)

[USB2.0] Mac OS 10.2.7or later

[FireWire] Mac OS 9.1, Mac OS X 10.2or later(10.0-10.1 are not supported)

☐ Rewritable firmware

The firmware is rewritable by downloading from PC via USB2.0.

1.2.4 Electrical Performance

☐ Main unit

■ Power supply voltage : Universal power supply
Rating: AC100-120V, AC220-240V
(AC ± 10% V)

■ Power supply frequency : Rating : 50 to 60Hz (49.5 to 60.5Hz)

■ Rated power : Operating : About 45W
(when option is not attached)
About 55W
(when option is attached)
Standby : About 6W
(when option is not attached)

■ Insulation resistance : 10MΩ or more
(at 500VDC between AC line and chassis)

■ Dielectric withstand voltage: AC1500V, 1 min.(between AC line and chassis)

☐ TPU

■ Power supply voltage : DC+24V, A+5V (supplied from main unit)

■ Rated power : DC+24V, A1.3A
DC+5V, A0.3A

1.2.5 Compliant Standards

☐ Electromagnetic interference resistance : Compliant with VCCI Class B

☐ Immunity : JEIDA52-1998

☐ Leakage current : 0.25mA or less

☐ Power supply harmonics : Compliant with Harmonic Suppression Guideline

☐ Environmental protection : Compliant with International Energy Star Program

1.2.6 Electrical Noise Resistance

- Static electricity:
  Panel section : 10kV
  Metal section : 7kV/150p, F150Ω

1.2.7 Environmental Conditions

Table 1-1. Environmental Conditions

	Temperature	Humidity (Non-condensing)
Operating	5 - 35°C	10 - 80%
Storage	-25 - 60°C	10 - 85%

1.2.8 Reliability

- Main unit
  MCBF : Carriage reciprocating movement = 100,000 times

1.2.9 Operating Conditions

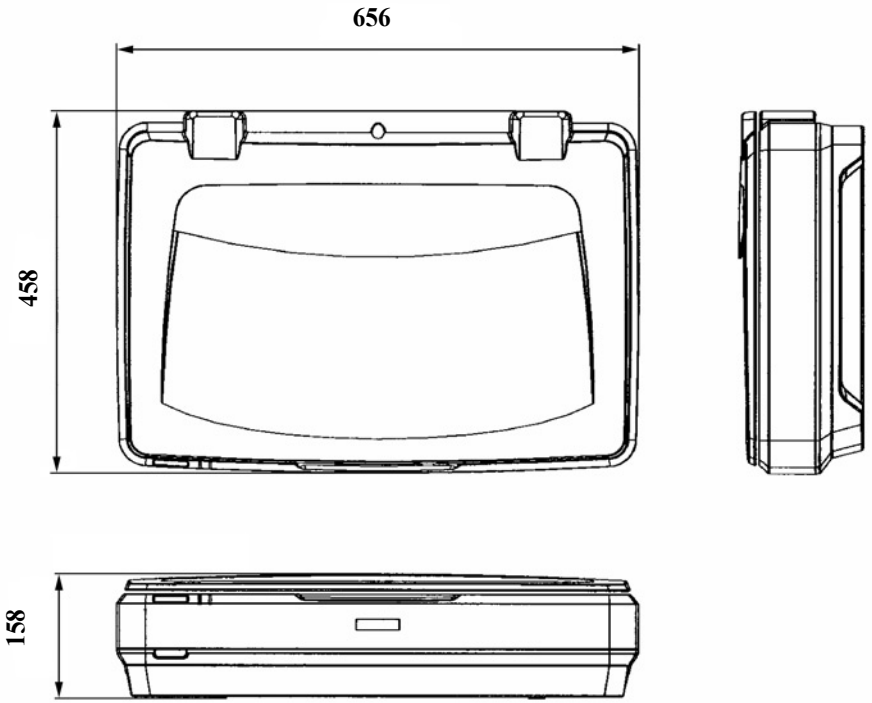
- Dust : General house/office level
  (Avoid extremely dusty environment)
- Luminous intensity : Avoid direct sunlight and vicinity of light source.

1.2.10 Document Conditions

- Reflective documents : Documents with smooth surface, such as photos and prints.
- Transparent documents
  - Supported document type : Positive film
    Negative film
  - Document size : Any size. The following films are available by use of film holders:
    5mm strip film
    35mm slide film
    Brownie size film (up to 6 x 18mm)
    4 x 5 inch film

1.2.11 Size and Weight

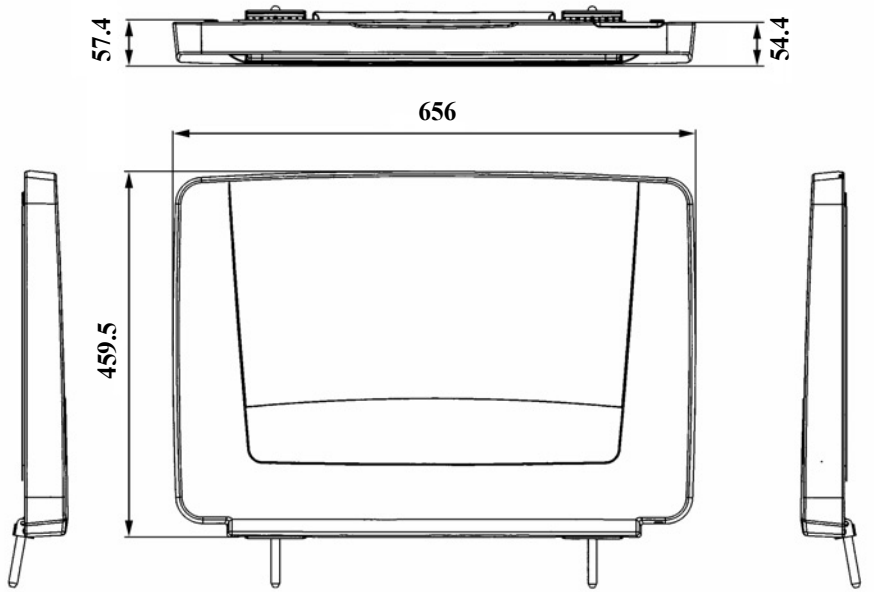
- Main unit
  - Size (width x depth x height): 656 x 458 x 158mm
  - Weight: Approx. 13Kg



<Unit: mm>

Figure 1-1. Outline Drawing

- TPU
  - Size (width x depth x height): 656 x 460 x 40mm
  - Weight: Approx. 6Kg



<Unit: mm>

Figure 1-2. Outline Drawing

1.3 Interface Specifications

1.3.1 Overview

The interface layout of this scanner is shown below.

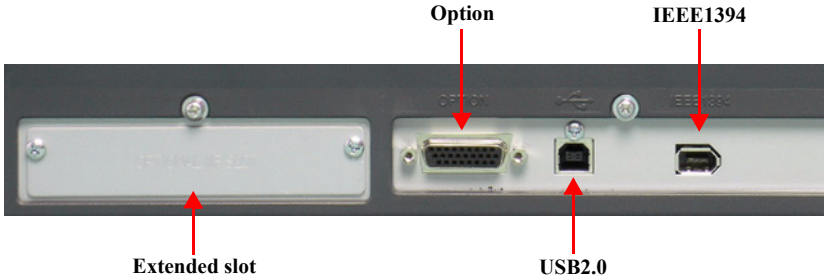


Figure 1-3. Interface Layout of ES-10000G

1.3.2 IEEE1394

- IIEEE1394a-2000 compliant (400Mbps)
- ANSI X3T10 Serial Bus Protocol 2 Revision 4L (SBP-2) compliant
- One 6-pin connector

1.3.3 USB2.0

- Universal Serial Bus Specification Revision 2.0 compliant
- Hi-Speed device (480Mbps) (Full speed capable (12Mbps))
- Self-power supply
- One standard B receptacle connector

1.3.4 Multi Interface Compatibility

This scanner has the USB2.0 and IEEE1394 serial bus I/F as standard, Three interfaces are available by installing an I/F for network into the option slot.

In this case, we do not guarantee simultaneous connection to and simultaneous use of the above three interfaces basically.

1.3.5 Control Code List

Table 1-2. Control Code List

Category	Name	Code
Execution command	ID request	ESC I
	Status request	ESC F
	Extended status request	ESC f
	Status setting request	ESC S
	Scan start	ESC G
	Push Button status request	ESC !
	Extended ID request	FS I
	Scanner status request	FS F
	Scan parameter request	FS S
	New scan start	FS G
Data form designation	Data format setting	ESC D i
	Resolution setting	ESC R n1 n2
	Zoom setting	ESC H i1 i2
	Scanning range setting	ESC A n1 n2 n3 n4
	Color setting	ESC C i
	Mirror image inversion setting	ESC K i
	Scan parameter setting	FS W
Correction processing	Lightness correction setting	ESC L i
	Gamma correction setting	ESC Z i
	Gamma correction table setting	ESC z i d[256]
	Edge enhancement setting	ESC Q i

Table 1-2. Control Code List

Category	Name	Code
Image processing	Halftone processing setting	ESC B i
	Area judgement processing setting	ESC s i
	Dither pattern setting	ESC b i j d[j^2]
	Color correction setting	ESC M i
	Color correction factor setting	ESC m d[9]
	Threshold value setting	ESC t i
Auxiliary, etc.	Scan mode setting	ESC g i
	Initialization	ESC @
	Line counter designation	ESC d i
	Option control	ESC e i
	Film type designation	ESC Ni
	Focus adjustment	ESC pi
	Focus position state request	ESC q
	Paper exit	FF
	Paper feed	PF
Control	Normal response	ACK
	Abnormal response	NACK
	Scanning stop	CAN
	Header	STX

1.4 Operational Specifications

1.4.1 Operation Switches

☐ OPERATE Switch

- Used to switch power ON/OFF.
- When powered ON, the scanner performs initialization operation.

☐ Scan Navigation Button

- Scanning start (for network connection)
- Startup of scanner application software (for local connection)

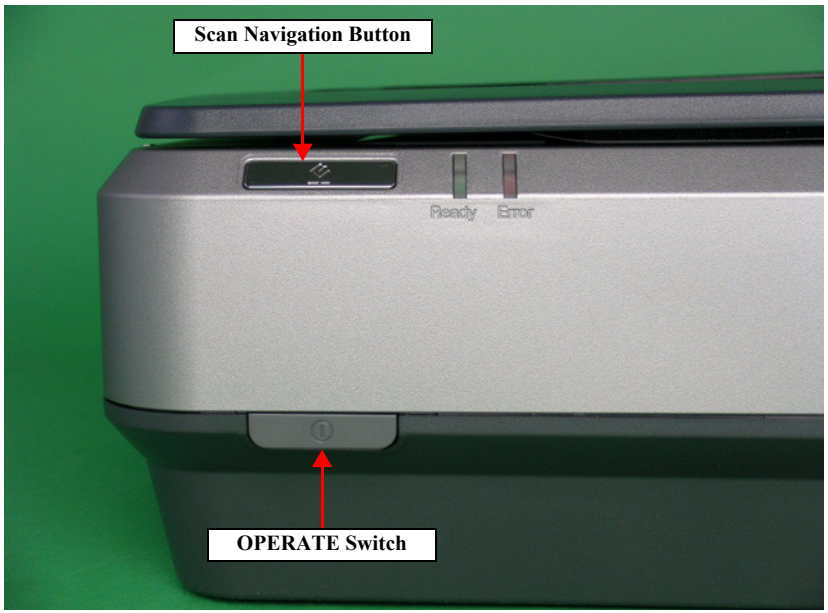


Figure 1-4. OPERATE Switch and Scan Navigation Button

1.4.2 Document Scanning Area

- Reflective document
  - Size: 310 x 437mm (main scan x sub scan)

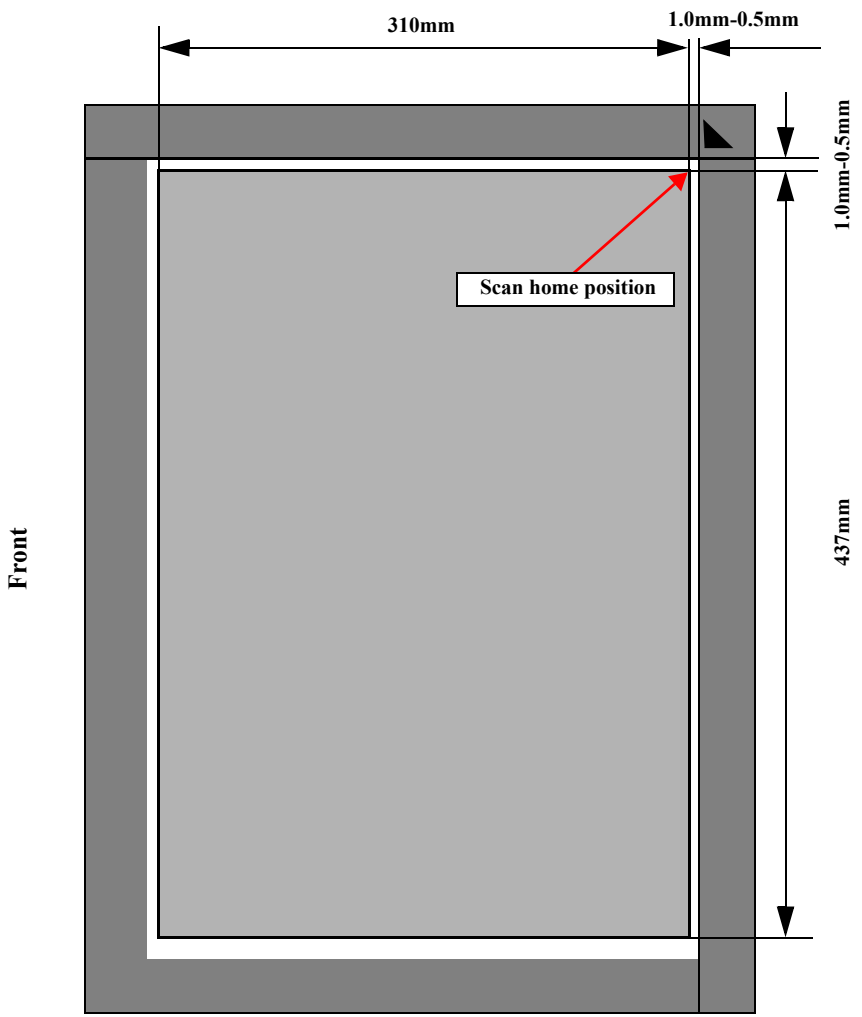


Figure 1-5. Maximum Effective Scanning Area

- Transparent document
  - Size: 309 x 420mm (main scan x sub scan)

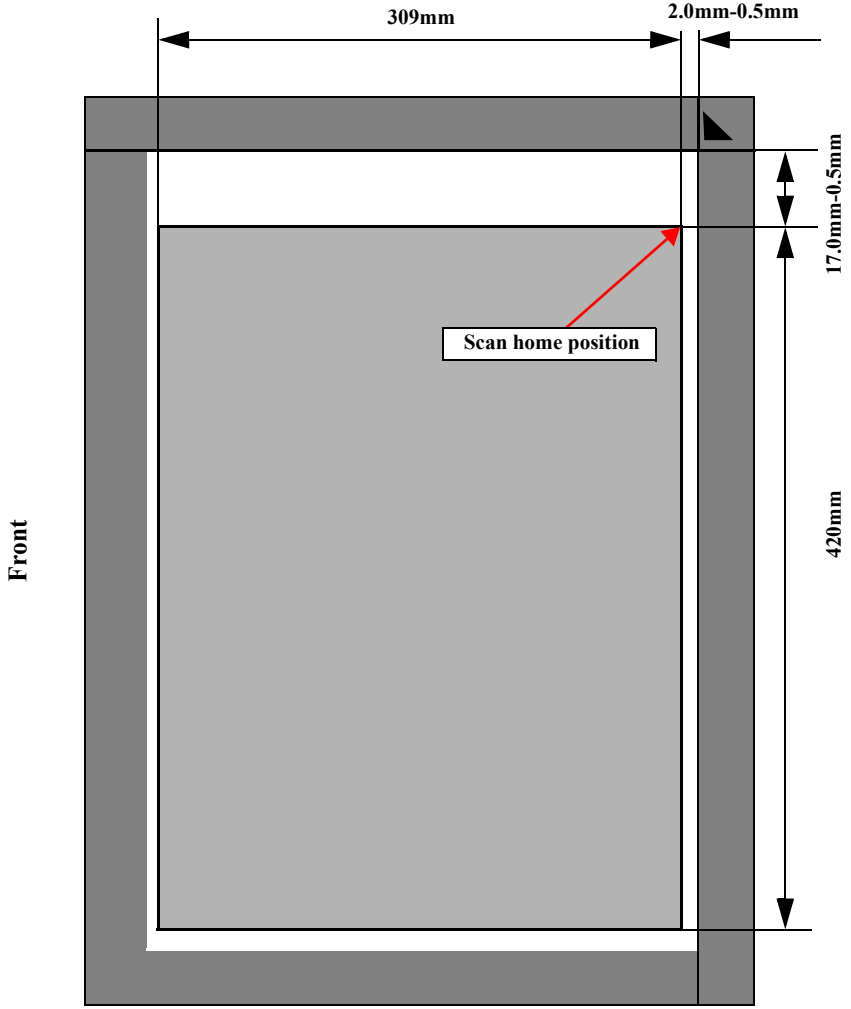


Figure 1-6. Maximum Effective Scanning Area

1.4.3 Displays Specifications

The scanner has two LED lamps, each of which has the following functions.

- READY (Green LED)

  This LED is lit to indicate that a command or data can be sent or received. (During image scanning, the LED flashes as it is lit and extinguished alternatively according to data transfer.)
  At error, this LED flashes in conjunction with the ERROR LED.

- ERROR (Red LED)

  Lit, flashes or extinguished to indicate the error state of the scanner.

Table 1-3. Definitions of LED Indications

READY LED (Green)	ERROR LED (Red)	Error Definition
On	On	Command error
Off	Flashing	Communication error
Flashing	Flashing	Fatal error
On	Off	Option error

NOTE: *Refer to Chapter 3 on how to recover from errors.*

1.4.4 Carriage Lock

The Carriage Lock is built in the rear of the main unit to protect the Carriage Unit from impacts during transportation or movement. This scanner requires the Carriage Lock to be in the "UNLOCK" position to insert the Power Cable.

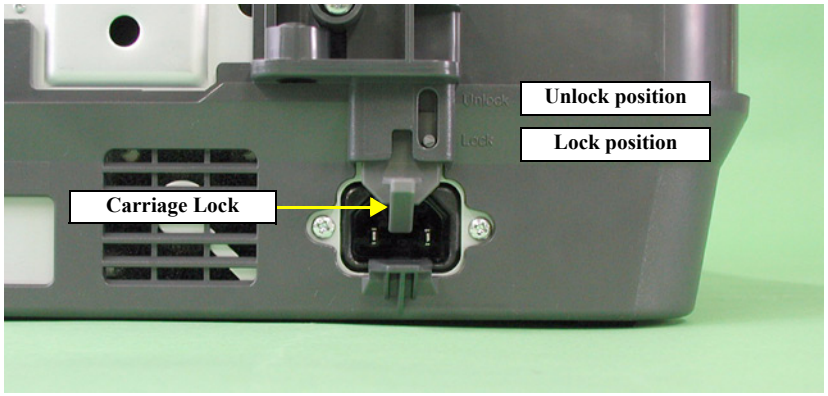


Figure 1-7. Carriage Lock

1.5 Error Handling

Table 1-4. Error Detail and Corrective Action List

Classification	Indication	Cause	Corrective action	Recovery	Receivable command
Command error	READY LED lit ERROR LED lit	An undefined command or undefined command parameter was received.	Return NACK and wait for the next command. When a wrong command parameter was received, ignore that value and hold the original value.	Receive a correct command to recover from the error.	-
Communication error	Unsupported (as SCSI is not provided)				
Fatal error	READY LED flashing ERROR LED flashing	The lamp is blown. The main unit is faulty. The optional equipment is abnormal or unsupported board was inserted.	Extinguish the lamp and stop operation. Set Bit 7 of the status bit.	Switch power off and then on again. Press the RESET switch. Send the initialization command (ESC@).	ESC, ESC f ESC @, FS F
Option error	READY LED lit ERROR LED extinguished	Cover open, paper empty, etc.	Set Bit 7 of the status bit.	Remove the cause of the error to recover from the error.	-

NOTE: *Refer to Chapter 3 "Troubleshooting" for details.*

CHAPTER

2

OPERATING PRINCIPLES

2.1 Overview

This scanner is roughly divided into the following units.

- ☐ Scanner Mechanism
  (Lens-integrated Unit Drive Mechanism, Document Size Sensor)
- ☐ Control Circuit
- ☐ Power Supply Circuit

This scanner features the Carriage Unit, in which the CCD Sensor Board, Inverter Board, Lamp (light source), Mirrors and Lens Mechanism are integrated into a single unit.The Carriage Unit contains the Auto Focus Motor to drive the Mirror Unit.

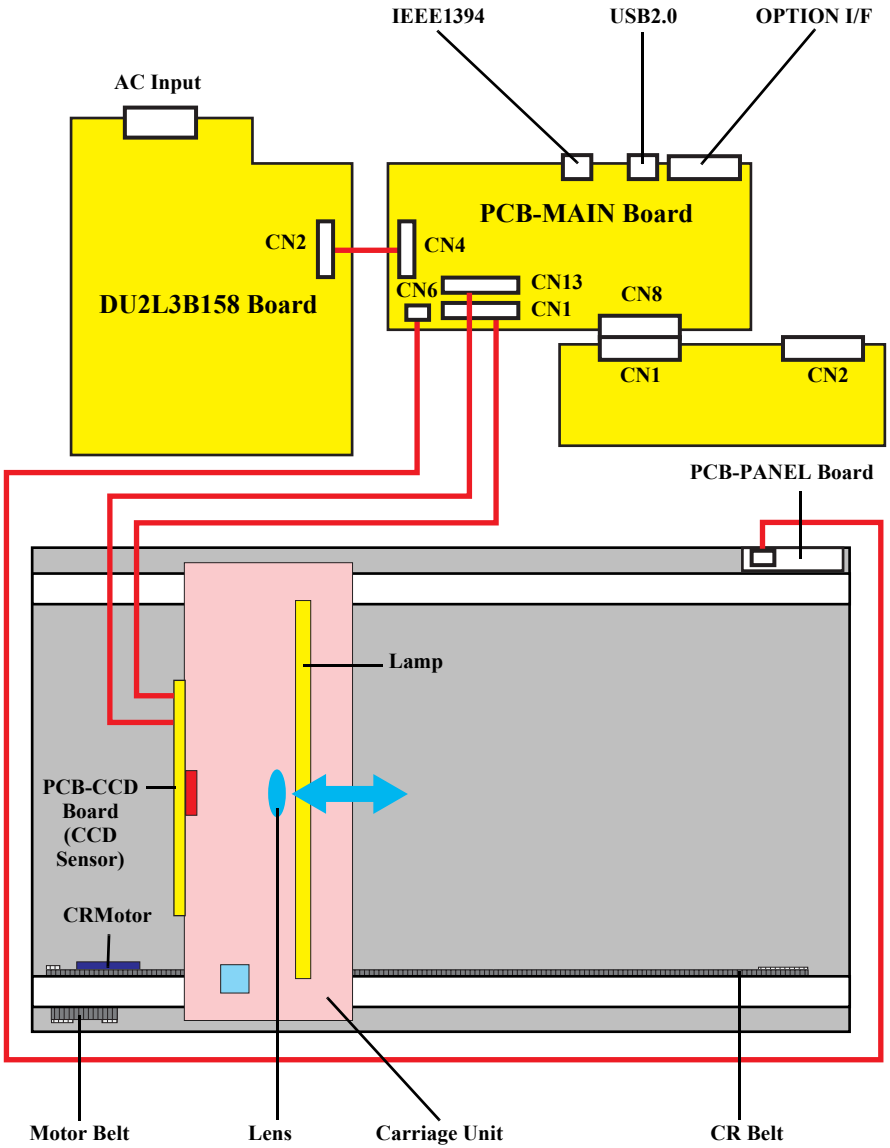


Figure 2-1. Main Mechanism Configuration

2.2 Mechanism Operation Overview

The optical system mechanism that scans the image of this scanner uses the Carriage Unit where the light source, CCD Sensor Board, AF lens, and Mirrors move together.

2.2.1 Carriage Drive System Mechanism

The Carriage Unit slides along the Guide Rail in the sub scanning direction. To perform this sliding operation, the CR (Carriage) Motor transmits its driving force to the Timing Belt secured to the Carriage Unit via the Drive Pulley and Deceleration Gear. The starting position of image data scanning is determined by the CR HP Sensor located on the Control Board.
A stepping motor is used as the CR Motor and driven by open loop control. *(Refer to Figure 2-2.)*

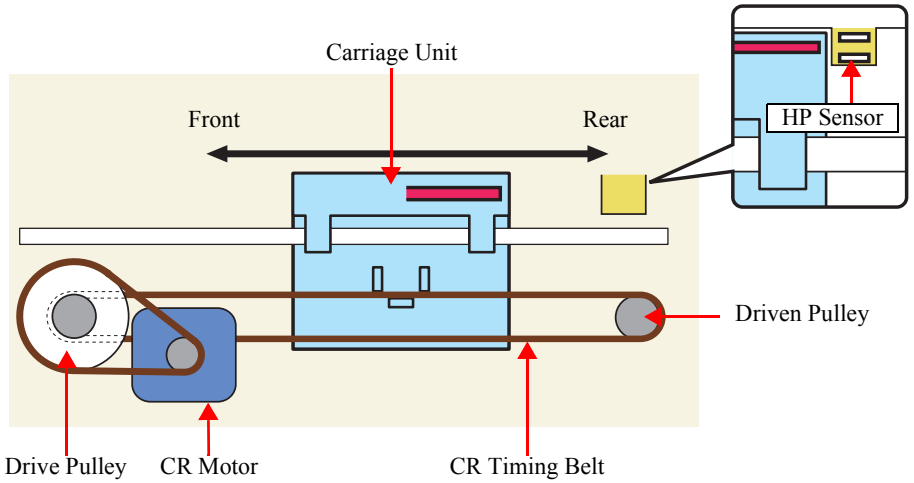


Figure 2-2. Carriage Operation

2.2.2 TPU Carriage Movement Mechanism

The TPU Carriage Unit slides along the Guide Rail in the sub scanning direction. To perform this sliding operation, the TPU CR (Carriage) Motor transmits its driving force to the TPU CR Timing Belt secured to the Carriage Unit via the Drive Pulley and Deceleration Gear.A stepping motor is used as the TPU CR Motor and driven by open loop control.*(Refer to Figure 2-3.)*

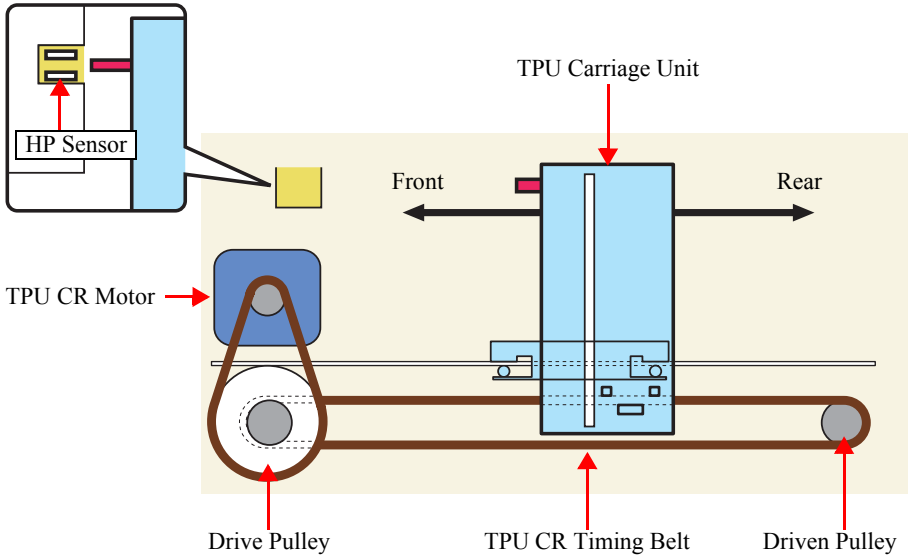


Figure 2-3. TPU Carriage Operation

2.2.3 Carriage Optical System Mechanism

Since the color CCD line sensor is used as a scanning device, the light source is single and color separation into R, G and B is achieved by the Color Filter on the CCD Sensor.

The light coming out of the light source (high-intensity cold cathode xenon lamp) in the Carriage Unit is applied to the document surface, its image is scanned in the main scanning direction, then reflected by multiple mirrors in the Carriage as a reflective light, and detected by the CCD.

In order to achieve auto focusing, the Mirror Unit consisting of Mirror 4 and Mirror 5 is moved by the Auto Focus Motor to adjust the distance from the document surface to the Lens/CCD Sensor.

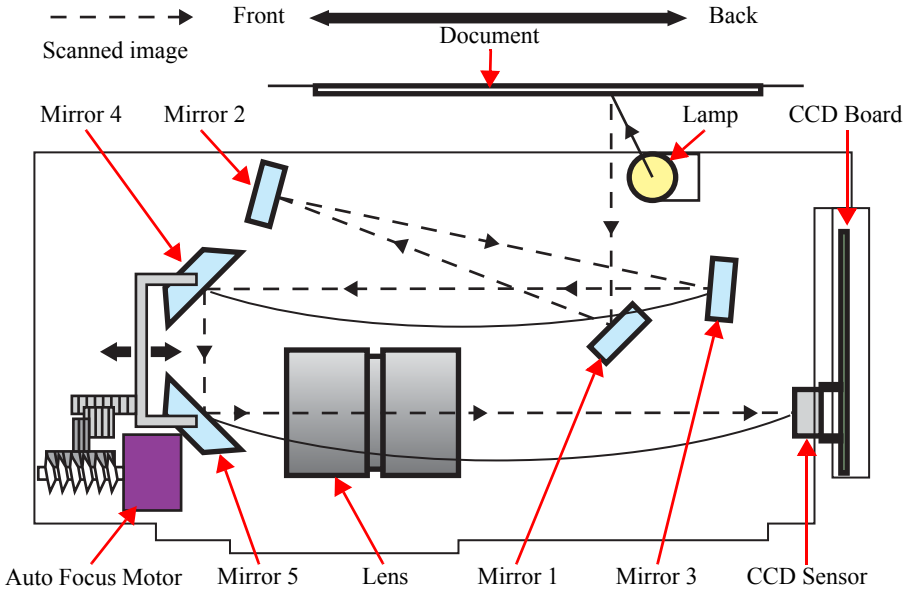


Figure 2-4. Mirror/Lens Mechanism

2.3 Electrical Circuit Operation Overview

2.3.1 Control Circuit Operation

The control circuit of this scanner consists of the following circuits.

- ☐ PCB-MAIN Board (Main control circuit board)
- ☐ PCB-CCD Board (CCD sensor board/installed on the Carriage)
- ☐ DU2L3B158 Board (Power Supply Board)
- ☐ PCB-PANEL Board (Operation panel board)
- ☐ PCB-TPU MAIN Board (TPU-Main control circuit board)

The control performed by the PCB-MAIN Board and PCB-CCD Board that form the heart of the control circuit will be explained in the order of size detection by the Document Size Detection Sensor, scanning, and image signal processing.

1. PCB-CCD Board (CCD image sensor)
   - ■ Photoelectric transfer processing (transduces the reflected light (light energy) from the document surface into electrical energy (electric charge))
   - ■ Amplification processing
2. PCB-MAIN Board (Scanned image data processing)

   Most of the following processings are performed by the ASIC (IC2) on this Board.
   - ■ A/D conversion processing (converts the scanned image data generated as an analog electrical signal into a 16-bit digital signal.)
   - ■ Shading correction processing (scanned image data correction using white and black reference values)
   - ■ Various image correction processings (executed on the basis of the setting conditions from the host, e.g. gamma correction, color correction, and halftone correction.)

   The above processings are performed, and the scanned image data are finally output to the host.

PCB-MAIN BOARD

Name	Location	Description
H8S/2320	IC1	CPU 24-bit Address Bus 16-bit Data Bus
MBM29LV400TC -90PFTN-SFK	IC9	Flash Memory 512k x 8/256k x 16bit
IDT71V016L10PH	IC11,12	SRAM 64k x 16bit
T-REX2 (E02A34EB)	IC3	ASIC:Manages the following: Line control Image processing Buffer control
S1R72003F00B	IC15	USB2.0 interface
TSB43AA82APGE	IC13	IEEE1394 interface
IDT71V416L10PH	IC27	SRAM 256k x 16bit
M48LC16M16AT2G-75	IC8	SDRAM 4M x 16bit x 4bank
A3957SLB	IC5,6	CR Motor driver IC
AN8015SH	IC33	DC-DC Converter +24V IN +12V OUT
BA033FP	IC17,24	DC-DC Converter +5V IN +3.3V OUT
BA00ASFP	IC2	DC-DC Converter +15V IN +12V OUT

PCB-CCD BOARD

Name	Location	Description
MILLIE2 (E02A41YA)	IC2	CCD/AFE drive signal generation
AD9826	IC3	16bit A/D Converter
ILX184K	IC1	CCD
TA78M05F	IC4	DC-DC Converter +5V OUT

PCB-TPU BOARD

Name	Location	Description
LB1946E	IC3	CR Motor driver IC

PCB-PANEL BOARD

This board is mounted with the Scan Navigator Button and LED Lamps (READY, ERROR).

DU2L3B158 BOARD

The Power Supply Board (DU2L3B158) of this scanner is a universal feature power supply, and supports the AC input voltages of 100V to 240V at the rated input.The Power Supply Board is also equipped with the Power Switch.

NOTE: *Inrush current = 40A (100VAC)*
= 30A (240VAC)
Leakage current = 0.25mA or less (100VAC)
= 3.5mA or less (240VAC)

The DC power generated and output is supplied to each mechanism as indicated below.

Table 2-1. DC Output Voltage

DC Output Voltage	Supply Destination
+24V	PCB-MAIN CN4-11,12
+15V	PCB-MAIN CN4-6
+5V	PCB-MAIN CN4-7,8

CHAPTER

3

TROUBLE SHOOTING

3.1 Overview

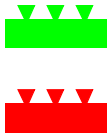
This chapter explains the remedies for errors detected by the self-diagnostic function as well as the check points on a fault phenomenon basis, which are required for efficient troubleshooting at occurrence of any error.

3.1.1 Self-Diagnostic Function

This scanner has a self-diagnostic function that automatically diagnoses the operating status of each section, and uses an LED indication to show the error state.This function detects the following error states, and their remedies are as described below.

FATAL ERRORS

Table 3-1. Fatal Errors

LED Indication	Cause	Corrective Action
 READY (Flashing) ERROR (Flashing)	• A Carriage home seek error at main unit or TPU occurred. 1. Leaving the Carriage fixing lever locked. 2. Motor connection error. 3. HP sensor fault/bad fit connection. • A lamp check error of main unit or TPU was detected. 1. Lamp fault, carriage adjustment error, CCD output error. 2. FFC connection error of Lamp or CCD. • An error was detected in CCD output level check. • An unsupported board was inserted into the option slot.	• Stop the Carriage and put it in a hold state (power off). • Turn the Lamp off. • Output shift pulses. • Set the error bits (Bit 7) of the status and extended status. • If the error was caused by the option, set the corresponding error bit of the extended status. • Display the fatal errors on the LED.
Recovery	• Switch power off, then on again. • Send the initialization command (ESC @). • Make a bus reset using USB and IEEE1394.	

The status is defined as an error as soon as the paper feed/ejection command is received.

COMMAND ERROR

Table 3-2. Command Error

LED Indication	Cause	Corrective Action
READY ERROR	Received an undefined command or undefined command parameter. Sent an unsupported command. Sent an unsupported setting parameter.	• Return NACK to the incoming command/ parameter from the host. • Display the command errors on the LED.
Recovery	Recovers from command errors at the time of receiving a defined command.	

COMMUNICATION ERRORS

Since the scanner doesn't have SCSI, it doesn't correspond to communication errors.

OPTION ERRORS

Table 3-3. Option Errors

LED Indication	Cause	Corrective Action
READY ERROR	• A Cover Open error occurred in TPU option. 1. Opened the cover during the scanner is in standby mode. 2. Sensor fault/bad fit connection.	• Set the corresponding error bit of the extended status. • Do not set the error bit (Bit 7) of the status and extended status. • Display the option errors on the LED.
Recovery	Recovers from the errors after the causes are removed.	

3.2 Action on Troubles

In this section, causes of troubles are organized by troubles. See Table 3-4 to find the trouble that you face, and check the scanner following the flowchart.

Table 3-4. Troubles, the Causes and Reference Flowchart

Troubles	Concrete Problems	Parts Causing the Trouble	Reference Flowchart
The Main Unit does not operate after powered on.	Main Unit doesn't operate initialization.	• Connector • PS Board • Carriage Motor • Main Board	3-1
Fatal Error occurred. (LED flashing red) When the indicated error occurs, the scanner doesn't recover from the error if it is switched on again.	Carriage Unit doesn't work.	• Upper Housing • Connector • Harness • Carriage Moving Mechanism • Carriage Motor • Main Board	3-2
	Flour-lamp doesn't light.	• Connector • Fluor-lamp • Carriage • Main Board	3-3
The quality of scanned images is abnormal.	Image cannot be scanned with high quality.	• Foreign matter on the Document Glass • Foreign matter on the Mirror • White sheet area • CCD Board • Main Board	3-4

Table 3-4. Troubles, the Causes and Reference Flowchart

Troubles	Concrete Problems	Parts Causing the Trouble	Reference Flowchart
TPU doesn't work.	TPU doesn't work.	• Cable • TPU Main Board • Main Board	3-5
	TPU Carriage Unit doesn't work.	• TPU Lower Housing • Connector • TPU Harness • TPU Carriage Moving Mechanism • TPU Carriage Motor • TPU Main Board	3-6
	Fluor-lamp of TPU doesn't light.	• Connector • Fluor-lamp • TPU Carriage • TPU Main Board	3-7

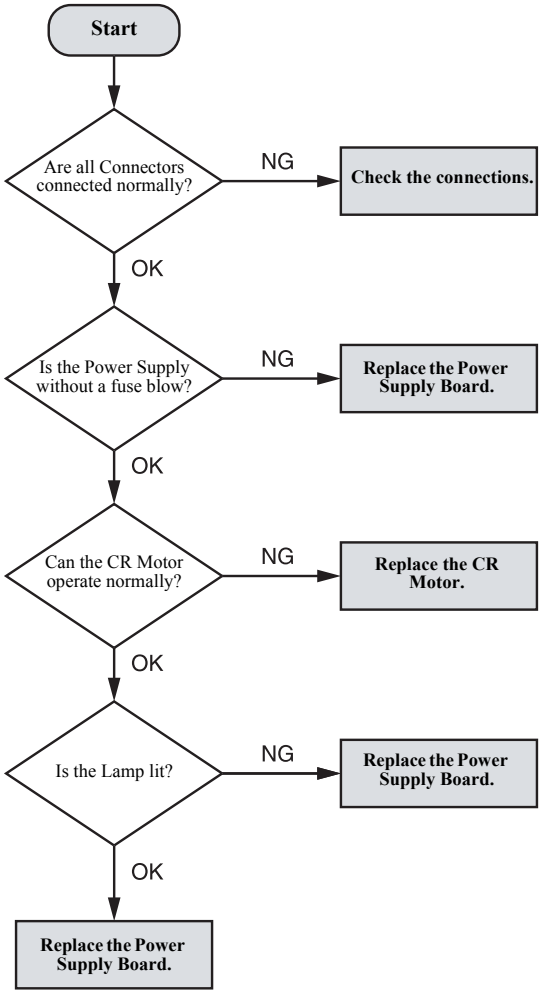


Figure 3-1. Main Unit doesn't operate initialization.

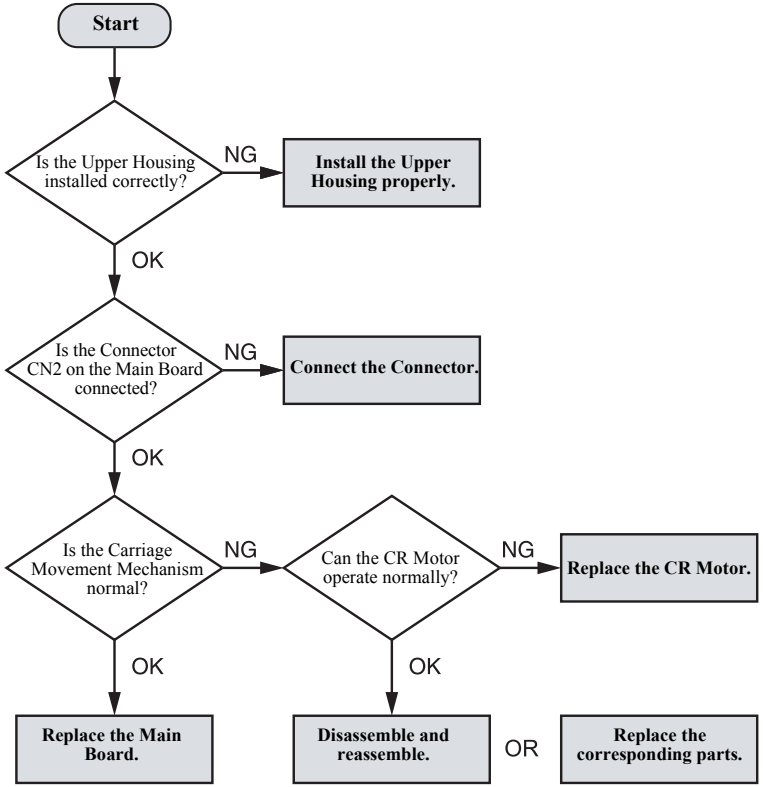


Figure 3-2. Carriage Unit doesn't work.

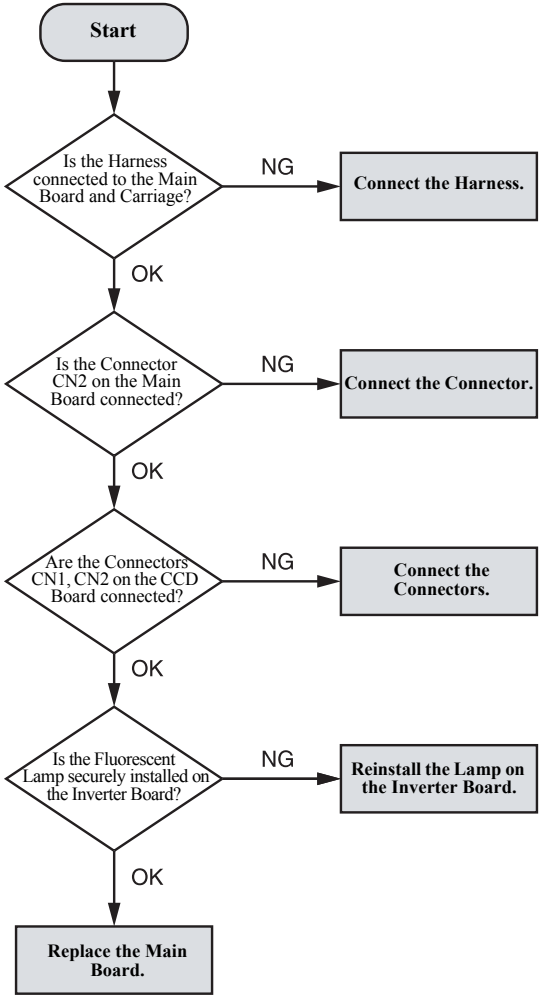


Figure 3-3. Fluor-lamp doesn't light.

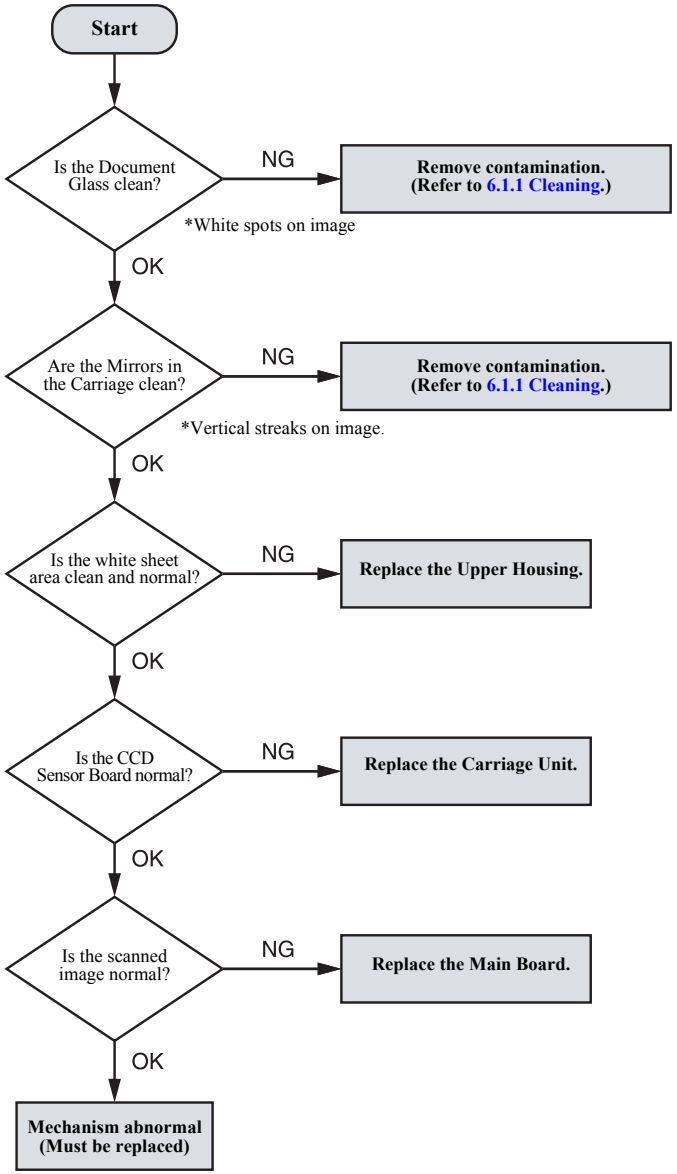


Figure 3-4. Image cannot be scanned with high quality.

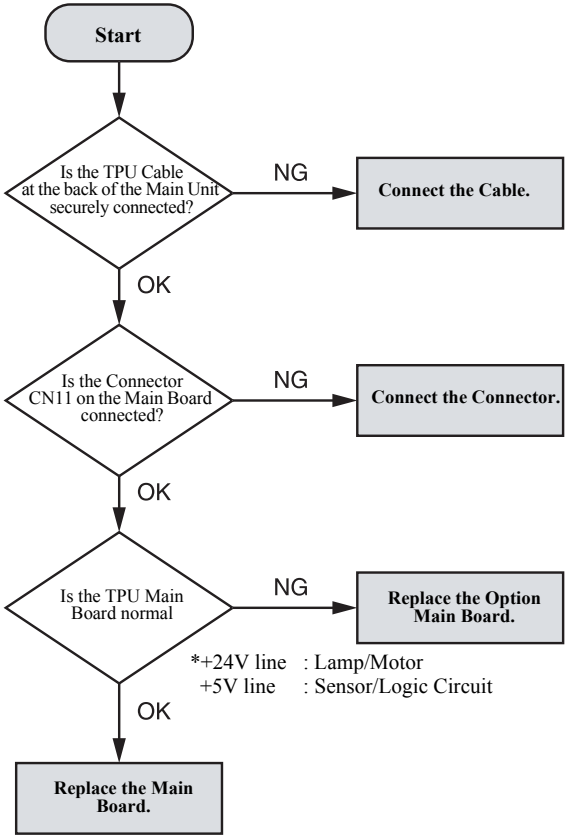


Figure 3-5. TPU doesn't work.

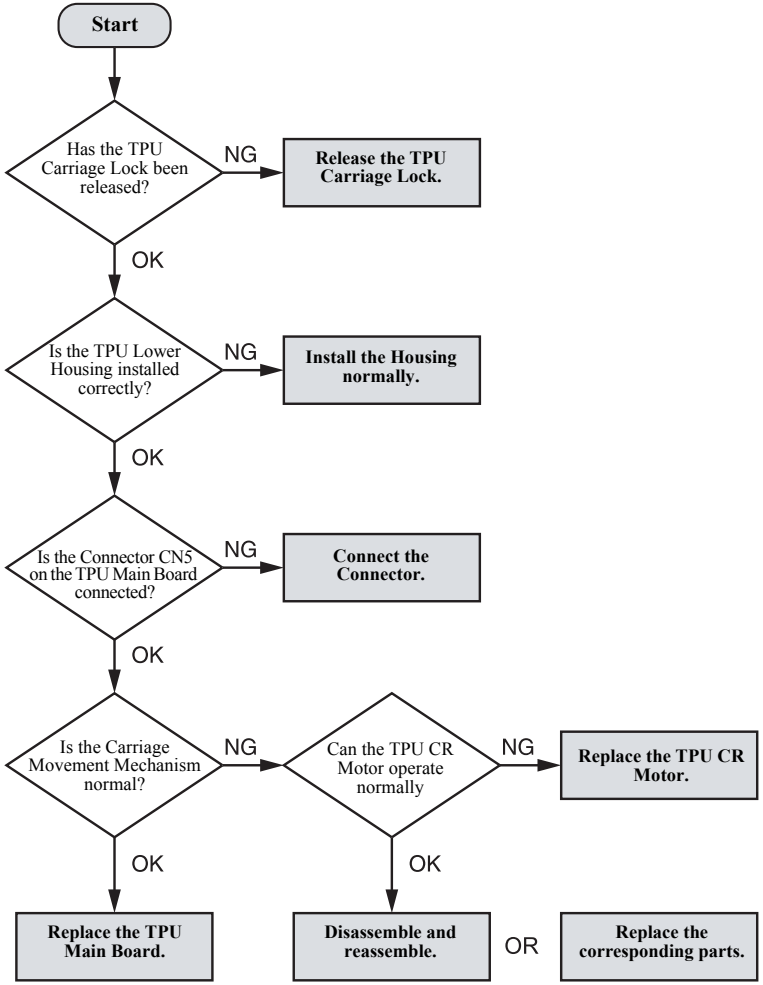


Figure 3-6. TPU Carriage Unit doesn't work.

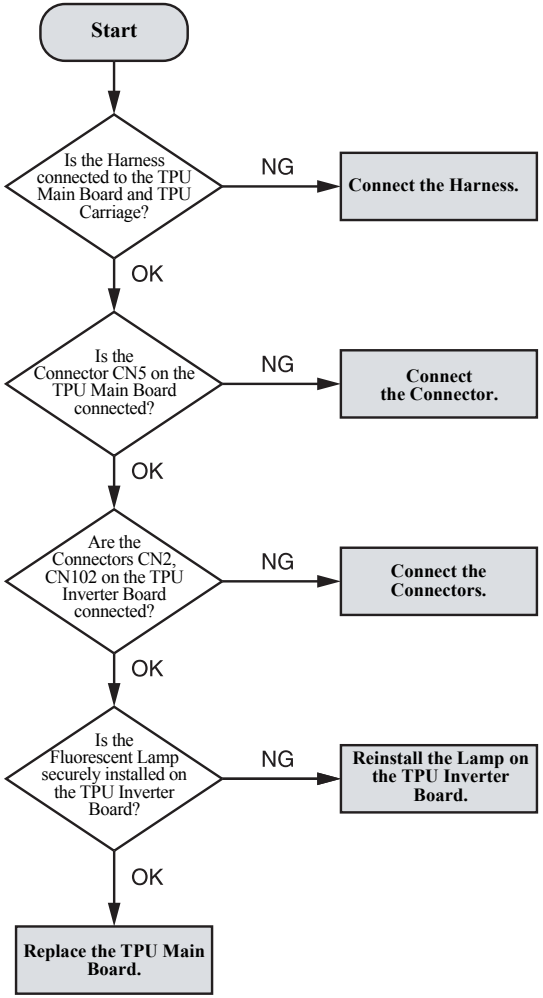


Figure 3-7. Fluor-lamp of TPU doesn't light.

CHAPTER

4

DISASSEMBLY/ASSEMBLY

4.1 Overview

This chapter explains the procedures for disassembling the major units and parts of the product. Unless otherwise explained, reassembly should be carried out in the reverse order of the disassembly procedure. When you have to remove any units or components that are not described in this chapter, refer the exploded diagram in the Appendix. Before starting disassembly, always read the precautions described in the next section.

4.1.1 Precautions

Before starting the disassembly or reassembly of the product, always read the following precautions given under the headings "WARNING" and "CAUTION".

- **Before disassembling or reassembling this product, always disconnect the Power Cable and Interface Cable. However, when you have to work with power ON for voltage measurement, etc., use extreme care not to get an electric shock and do the work in accordance with the procedure given in this manual.**
- **To prevent your hands from being cut by sharp edges, always wear gloves before starting disassembly/reassembly.**
- **When touching any internal components, use a static electricity discharger such as anti-static wrist straps, and handle them carefully to protect the microprocessors and circuits.**

- **Provide sufficient work space for disassembling and reassembling.**
- **Always use only the recommended tools for disassembly, reassembly and adjustment.**
- **Be sure to tighten the screws to the specified torque.**
- **Use the specified grease for lubrication. (Refer to Chapter 6 for details)**

The following figure shows the definition of the scanner orientations explained in the disassembly procedure.

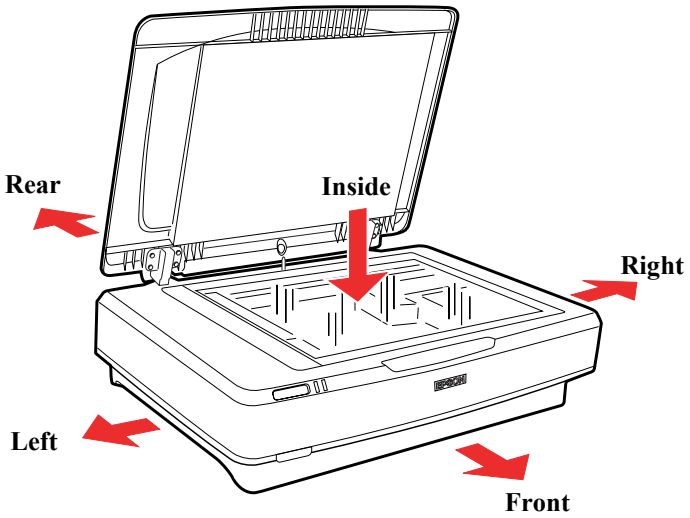


Figure 4-1. Orientation Definition

4.1.2 Recommended Tools

To protect this product from damage, use the specified tools indicated in the following table.

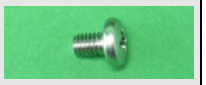
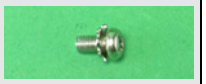
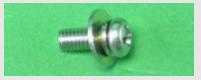
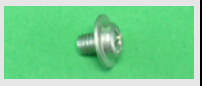
Table 4-1. Specified Tools

The Name of Tools	Supplier	Part number
Phillips screwdriver No. 1	EPSON	1080530
Phillips screwdriver No. 2	EPSON	1080532
Flat-blade screwdriver	EPSON	1080527
Allen hex socket driver (5 mm)	EPSON	TBD
Long-nose pliers	EPSON	1080564
Tweezers	EPSON	1080561

4.1.3 Screws Used in Disassembly and Reassembly

The screws used in this chapter are indicated below.When reassembling this product, do the work after fully confirming the screw types and the number of screws to be used in each section.(Refer to 4-2)

Table 4-2. List of Screws

No.	Standard	Outline	No.	Standard	
1	CBP, M4x12		13	CB SCREW, M3x18	
2	M3x4		14	M3x10	
3	CP (S-P1), M3x5		15	CB SCREW, M3x6	
4	M3x5		16	CB SCREW, M4x6	
5	CB SCREW, M3x8		17	CP (S-P2), M4x8	
6	CBP, M4x10		18	CP (O), M3x6	
7	CP (S-P1), M3x6		19	CC SCREW, M4x6	
8	CP (S-P2), M4x10		20	CC SCREW, M4x5	
9	CBP, M3x10		21	CBP, M3x6	
10	CP (S-P2), M3x12		22	CP (SP-1), M4x6	
11	SCREW HSH, M3x10		23	CP, M3x4	
12	CBP, M3x8				

4.2 Disassembly Procedure

This section illustrates how to remove the main components of this product. Unless otherwise specified, the reassembly procedure is omitted here since the product can be reassembled in the reverse order of the disassembly procedure. For the engagement of the main components, refer to the general exploded views in the Appendix.

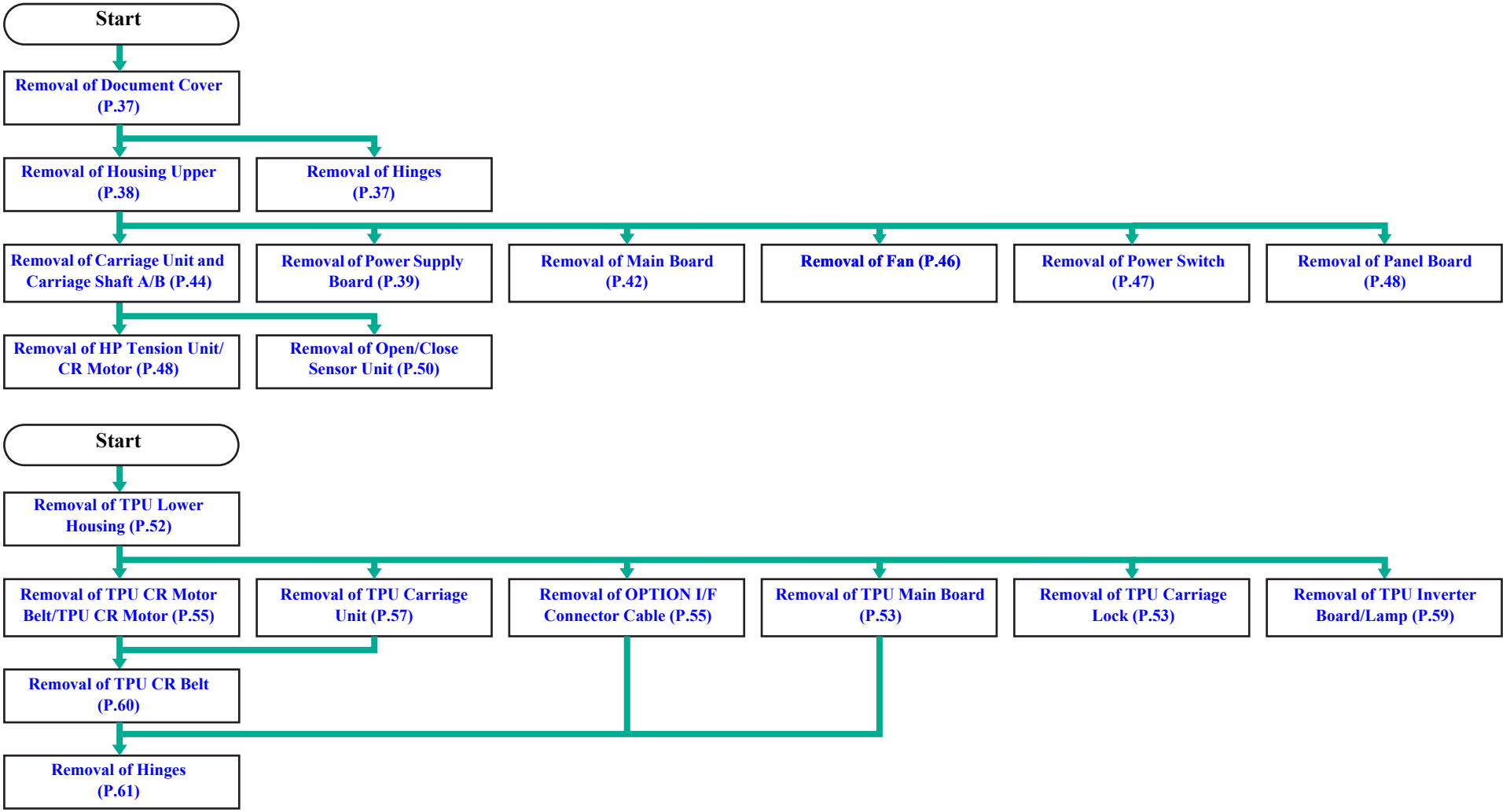


Figure 4-2. Disassembly Procedure Flowchart

4.2.1 Removal of Document Cover

1. Open the Document Cover.
2. Pull off and remove the Document Cover upward.

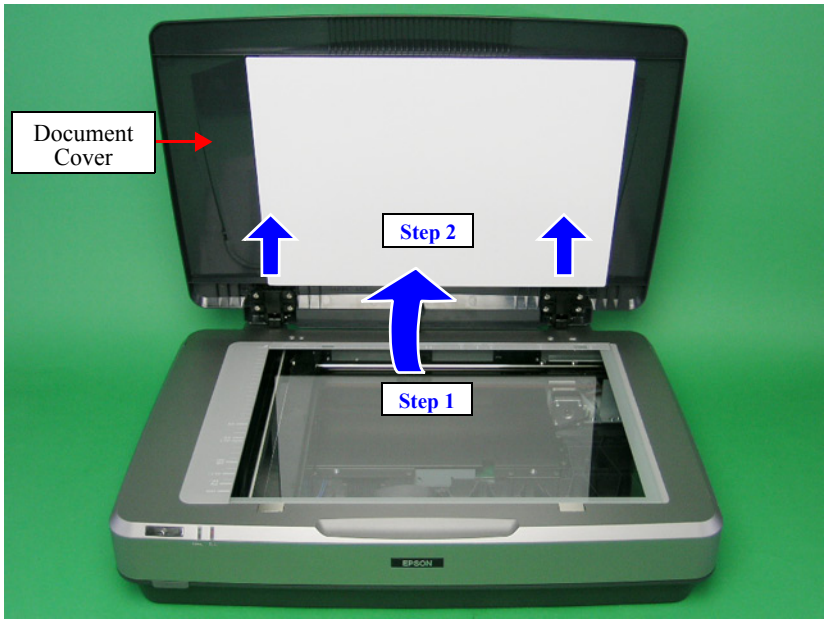


Figure 4-3. Removal of Document Cover

4.2.2 Removal of Hinges

1. Remove the Document Cover.(Refer to 4.2.1 Removal of Document Cover)
2. Remove the four screws (CBP M4 x 12) that are securing each of the Hinges, and remove both Hinges.

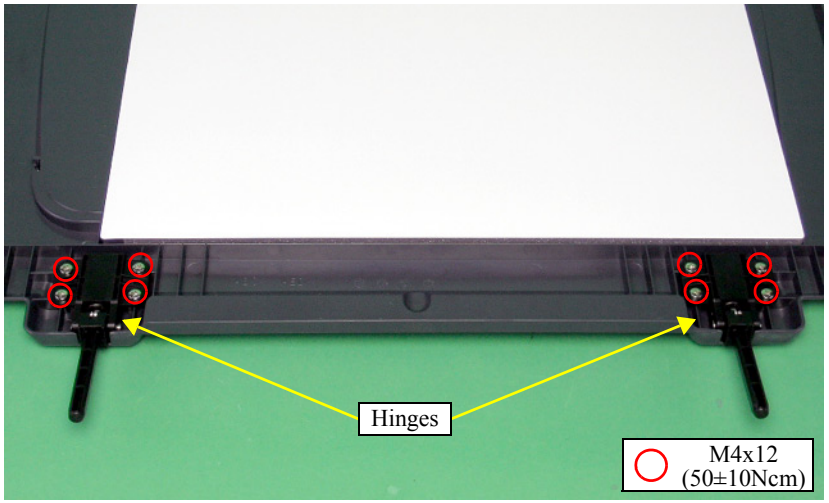


Figure 4-4. Removal of Hinges

4.2.3 Removal of Housing Upper

1. Remove the Document Cover.(Refer to 4.2.1 Removal of Document Cover)
2. Insert a flat-blade screwdriver into the notch of the Screw Protector, and remove the Screw Protector (4 pcs.) from the Housing Upper.
3. Remove the five screws (CBP, M4 x 12: 4 pcs., M3 x 4: 1 pc.) that are securing the Housing Upper.

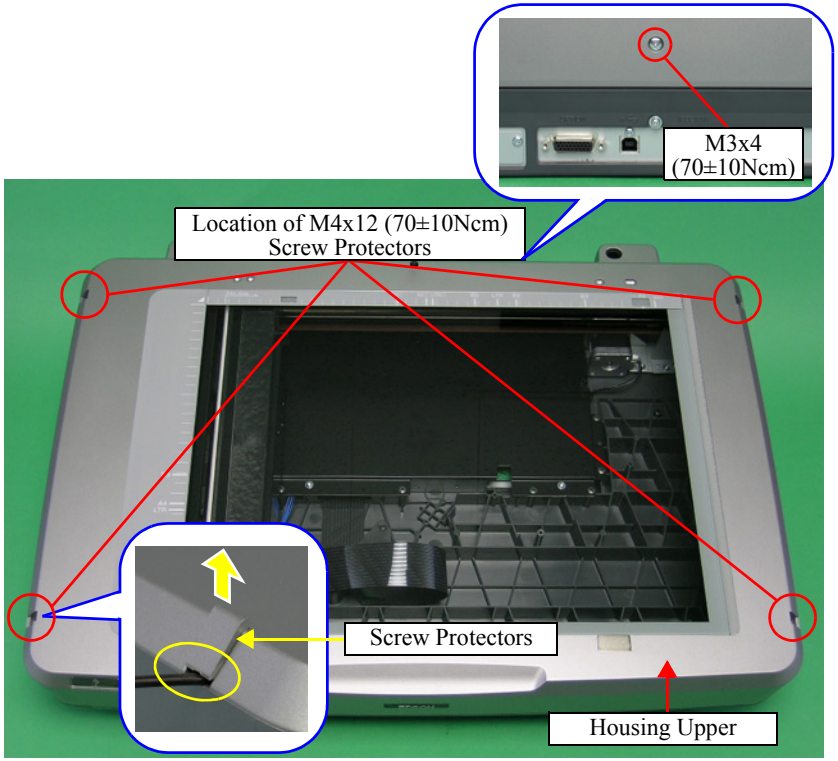


Figure 4-5. Removal of Screws and Screw Protectors

4. Lift and remove the Housing Upper.

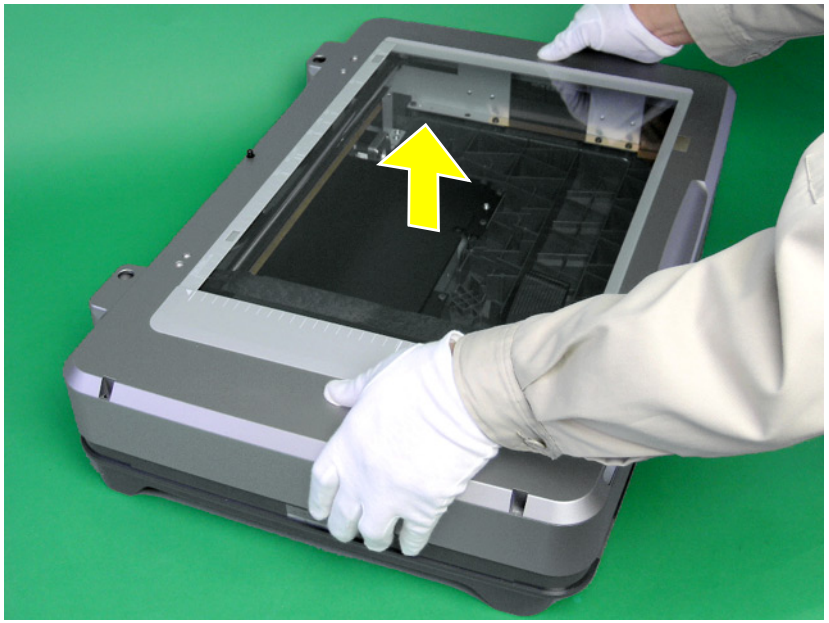


Figure 4-6. Removal of Housing Upper

REASSEMBLY

When reinstalling the Screw Protector, push it until it clicks.

4.2.4 Removal of Power Supply Board

1. Remove the Housing Upper.(Refer to 4.2.3 Removal of Housing Upper)
2. Remove the five screws (CP(S-P1), M3x5:2 pcs, CP(S-P1), M3X6:2 pcs, M3x5:1 pc) that are securing the Shield Plate, and remove the Shield Plate.

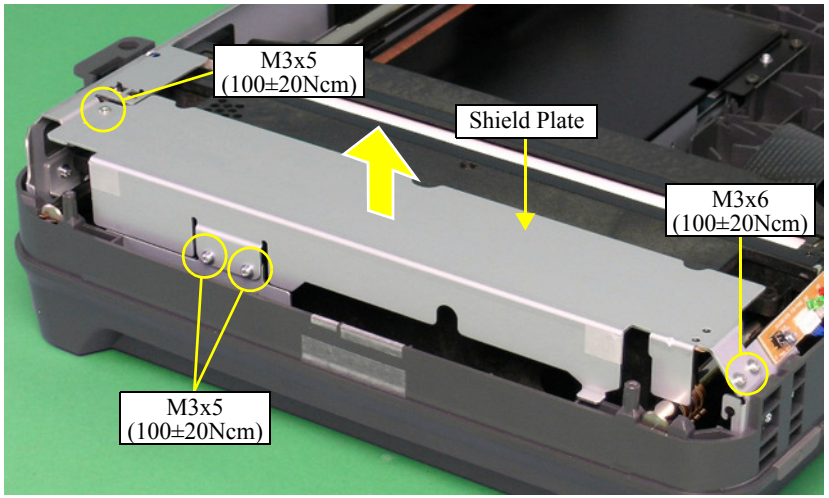


Figure 4-7. Removal of Shield Plate

3. Release the Carriage Lock.

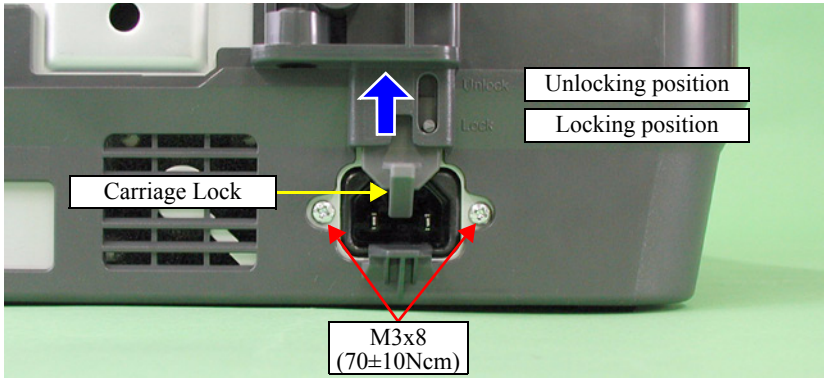


Figure 4-8. Unlocking of Carriage Lock

4. Move the Carriage Unit to the center.

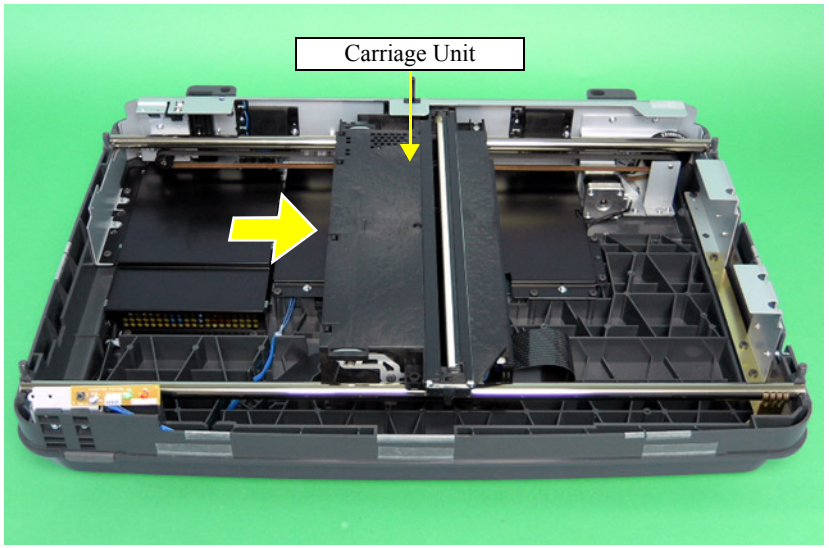
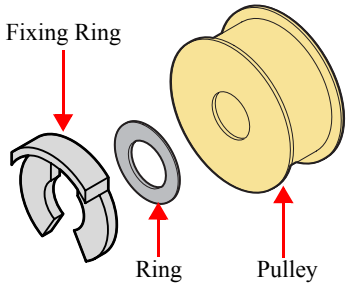


Figure 4-9. Movement of Carriage Unit

CAUTION

When doing the following procedure, be careful not to lose the Ring that is located between the Fixing Ring and Pulley.



5. Remove the Fixing Ring and Pulley from the CR Belt Tension Unit, and remove the CR belt.

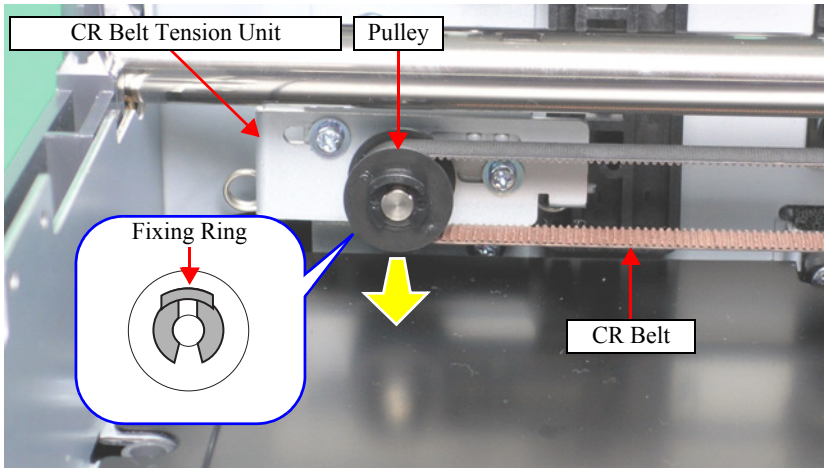


Figure 4-10. Removal of CR Belt

6. Remove the seven screws (CB SCREW M3x8:2 pcs, CBP, M4x10:4 pcs,CP(S-P1), M3x6:1 pc) that are securing Power Supply Board Cover.(Refer to Figure 4-8,Figure 4-11)

CAUTION

When doing the following procedure, be fully careful not to damage the Carriage Shaft B.

7. After lifting the front end of the Power Supply Board Cover, pull and remove it toward you.

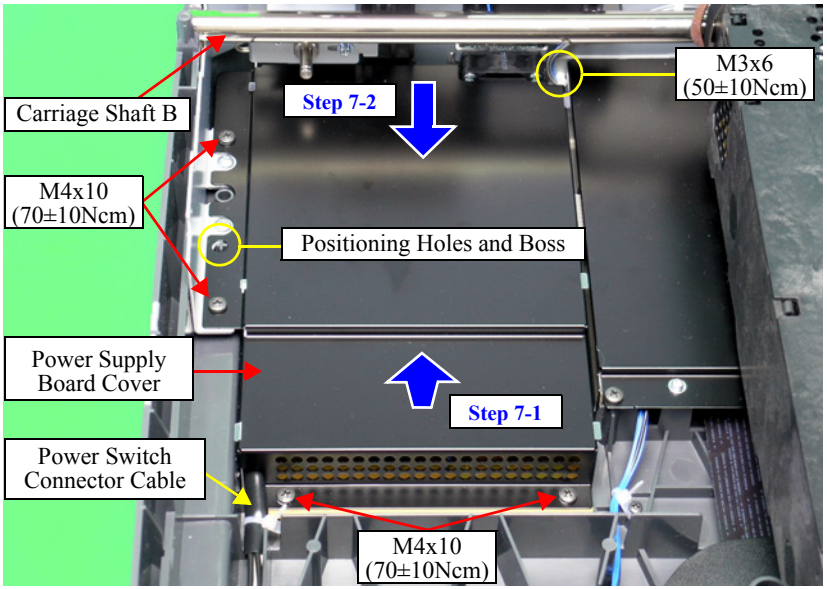


Figure 4-11. Removal of Power Supply Board Cover

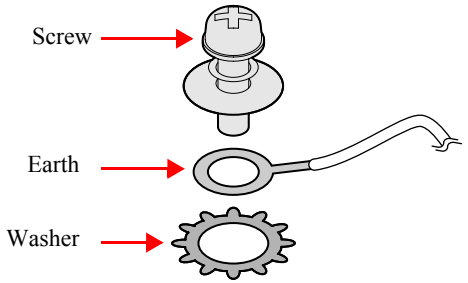
REASSEMBLY

- **Be careful not to put the Power Switch Connector Cable between any parts.**
- **When reinstalling the Power Supply Board Cover, match the Power Supply Board Cover hole and boss indicated in *Figure 4-11*.**

8. Disconnect the Power Switch Connector Cables (2 pcs: Black cable CN1, White cable CN4) from the Power Supply Board.

CAUTION

When doing the following procedure, be careful not to lose the washer located under the earth.



9. Remove the one screw (CP(S-P2), M4x10) that is securing the Earth Cable, and remove the Earth Cable.

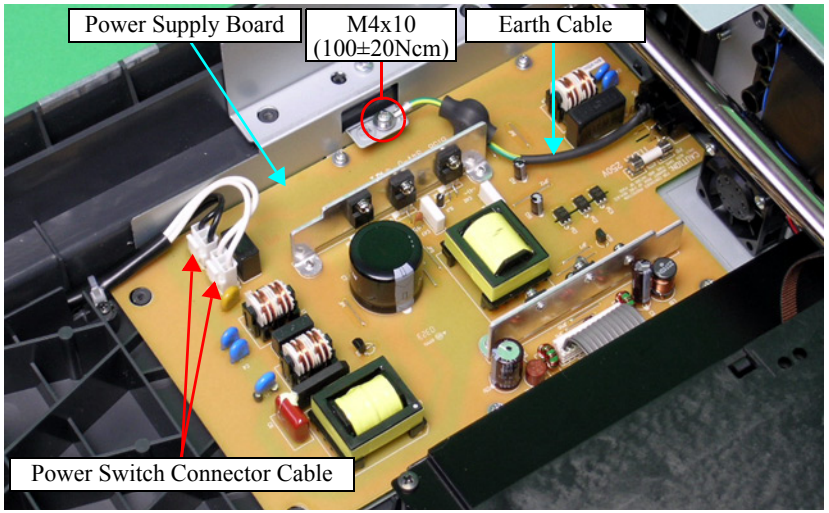


Figure 4-12. Removal of Cable (1)

10. Release the Harness Lock Mechanism, and remove the Harness from the Power Supply Board.

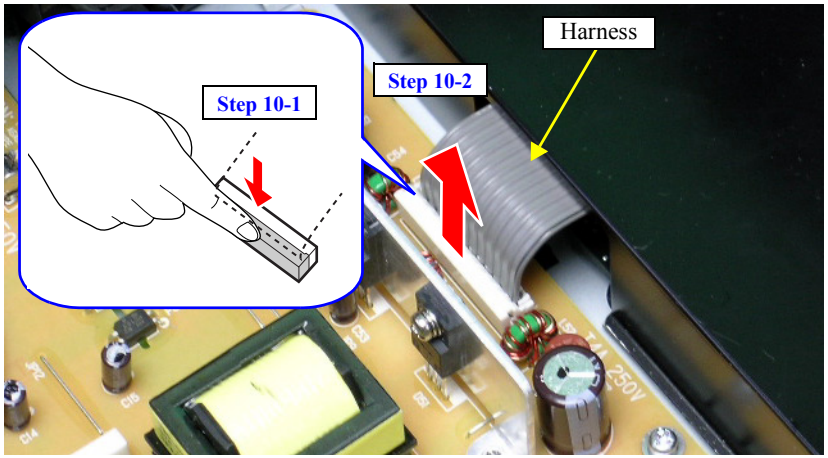


Figure 4-13. Removal of Cable (2)

REASSEMBLY

Be sure to insert each pin of the Harness into the Connector correctly.

11. Remove the four screws (CP(S-P1), M3x6) that are securing the Power Supply Board.
12. Lift the Power Supply Board avoiding the Power Switch Connector Cable, and slide and remove it toward you.

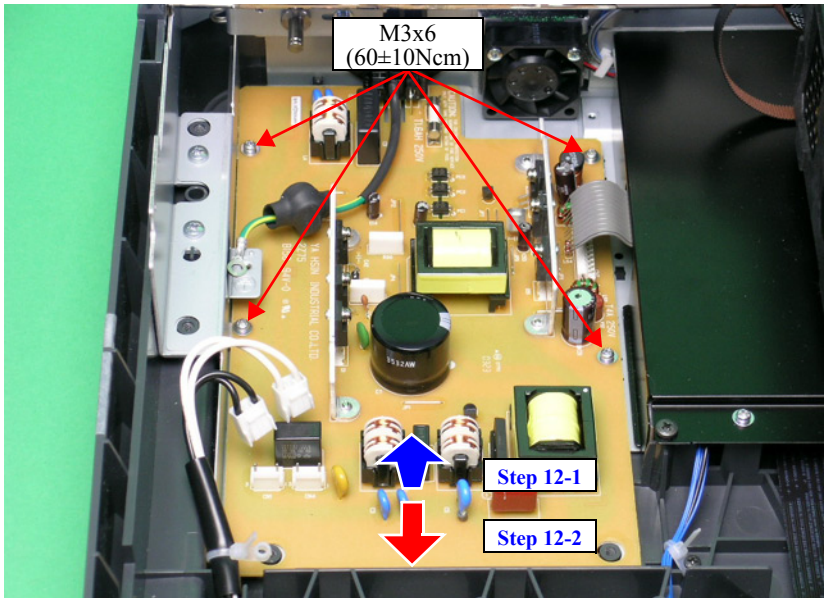


Figure 4-14. Removal of Power Supply Board

4.2.5 Removal of Main Board

1. Remove the Housing Upper. (Refer to 4.2.3 Removal of Housing Upper)
2. Release the Carriage Lock.(Refer to 4.2.4 Removal of Power Supply Board Step 3)
3. Move the Carriage Unit to the left edge.
4. Remove the 11 screws (CBP M4x10:6 pcs, CP(S-P1) M3x6:2 pcs, CP(S-P2) M3x12:3 pcs) that securing the Main Board Cover.

CAUTION

When doing the following procedure, be fully careful not to damage the Carriage Shaft B.

5. After lifting the Main Board Cover, pull and remove it toward you.

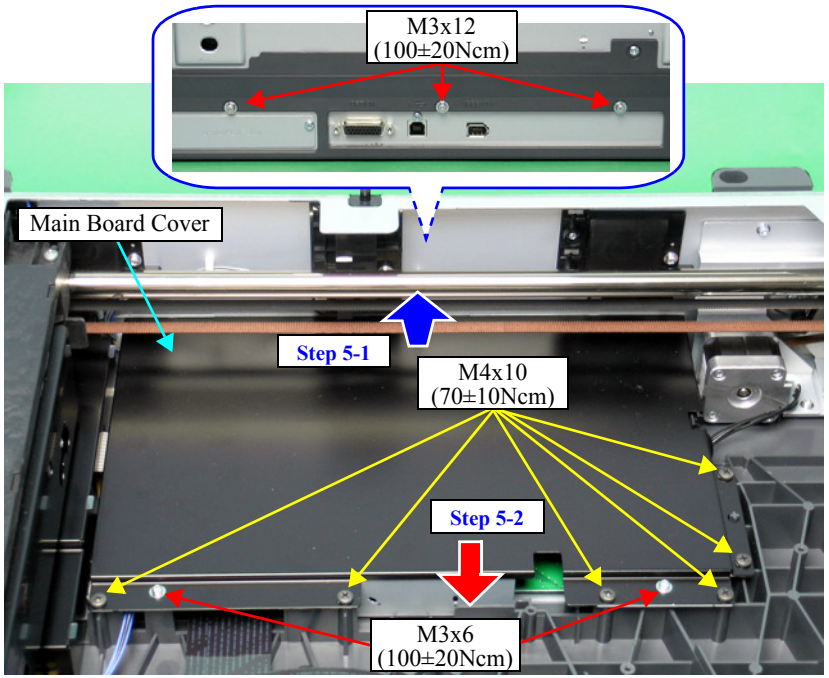


Figure 4-15. Removal of Main Board Cover

6. Remove the Connector Cables and Harness, shown in Refer to Figure 4-16, from the Main Board.

   CN1/CN13: Carriage FFC
   CN2: Motor Connector Cable
   CN3: HP Sensor/Open/Close Sensor Connector Cable
   CN4: Harness (Refer to 4.2.4 Removal of Power Supply Board Step 10)
   CN5: Fan Connector Cable
   CN6: Panel Connector Cable

7. Release the Fan Connector Cable, HP Sensor and Open/Close Sensor Connector Cable from the clamp.

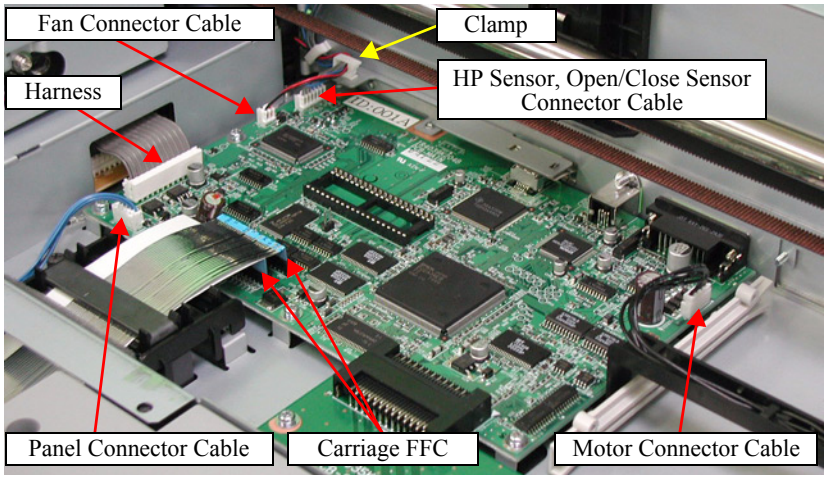


Figure 4-16. Removal of Main Board (1)

8. Remove the 12 screws (SCREW HSH, M3x10:2 pcs, CB SCREW, M3x8:1 pc, CP(S-P1), M3x6:9 pcs) that are securing the Main Board and Earth Cable, and remove the Main Board.

CAUTION

When doing the following procedure, be fully careful not to damage the Carriage Shaft B.

9. Remove the Main Board avoiding the protrusion of the Cover A.

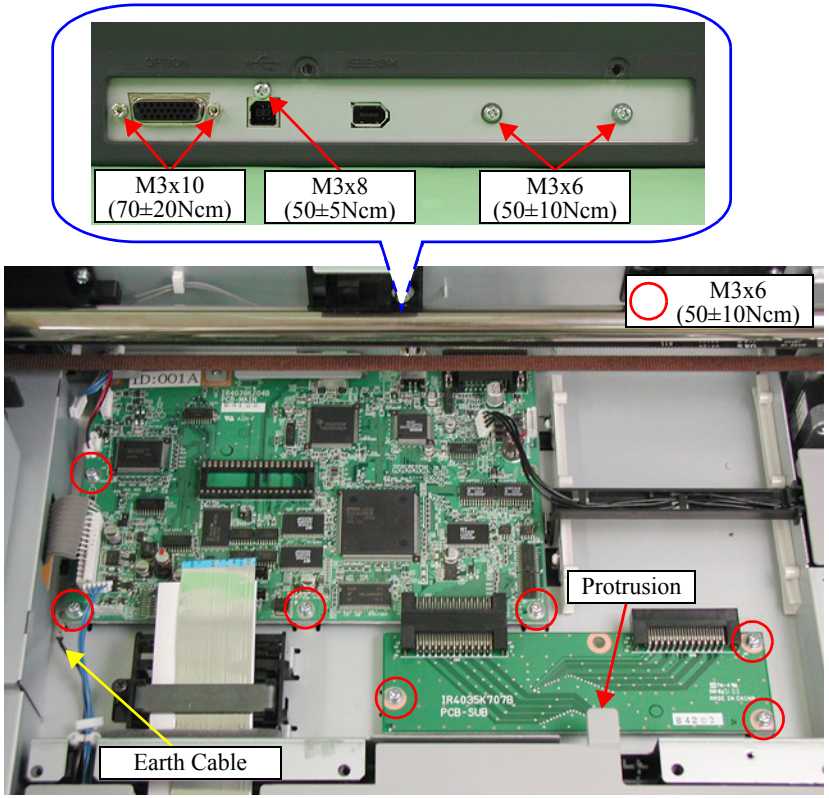


Figure 4-17. Removal of Main Board (2)

4.2.6 Removal of Carriage Unit and Carriage Shaft A/B

1. Remove the Main Board Cover.(Refer to 4.2.5 Removal of Main Board Step 2 to Step 5.)
2. Remove the Carriage FFC (2 pcs) from the Main Board Connector.
3. Remove the Carriage FFC Fixing Sheet from the notches of the Cover A.

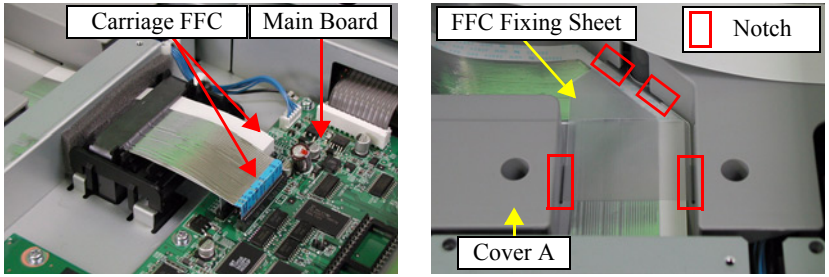


Figure 4-18. Removal of Carriage FFC and FFC Fixing Sheet

4. Remove the one screw (CBP, M3x10) that are securing the FFC Fixing Plate.
5. Slide the FFC Fixing Plate in the direction of the arrow and lift it, then pull the Carriage FFC (2 pcs) out from the plate and remove the FFC Fixing Plate.

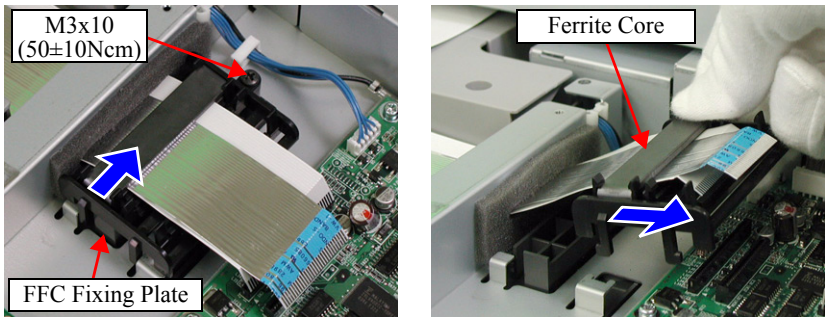


Figure 4-19. Removal of FFC Fixing Plate

REASSEMBLY

When reinstalling the FFC Carriage, be sure to put it through the Ferrite Core.

6. Remove the two-sided tape which is stuck to the Carriage FFC from the Cover A, and pull the Carriage FFC out from the Main/Power Supply Board Bracket.

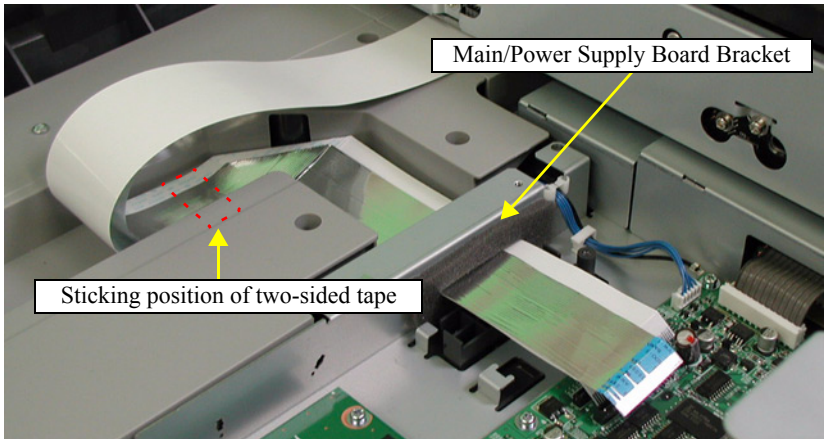


Figure 4-20. Removal of Carriage FFC

7. Move the Carriage Unit to the notch position shown in the following figure.

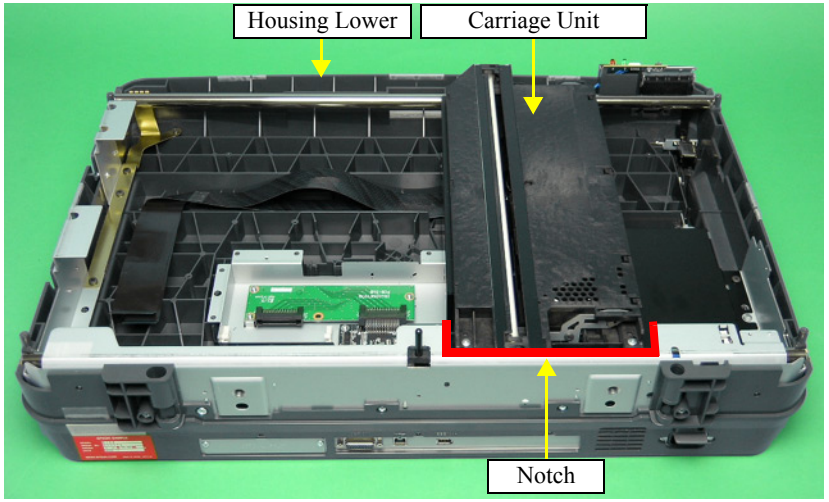


Figure 4-21. Moving the Carriage Unit

8. Remove the Fixing Ring and Pulley of the CR Belt Tension Unit, and remove the CR Belt.(Refer to 4.2.4 Removal of Power Supply Board Step 5)

CAUTION

When doing the following procedure, be fully careful not to damage the Carriage Shaft A.

9. Remove the right edge of Carriage Shaft A from the Bushing.

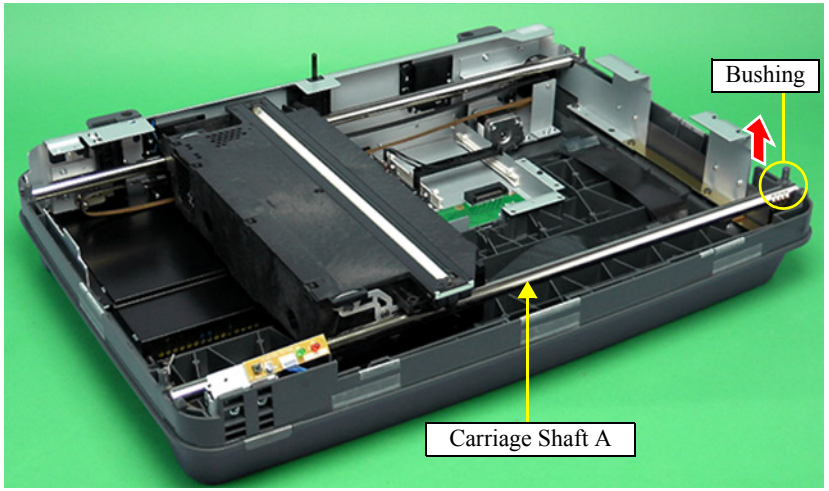


Figure 4-22. Removal of Carriage Shaft A (1)

10. While lifting the front end of the Carriage Unit, remove the left edge of the Carriage Shaft A from the Bushing, and remove the Carriage Shaft A.

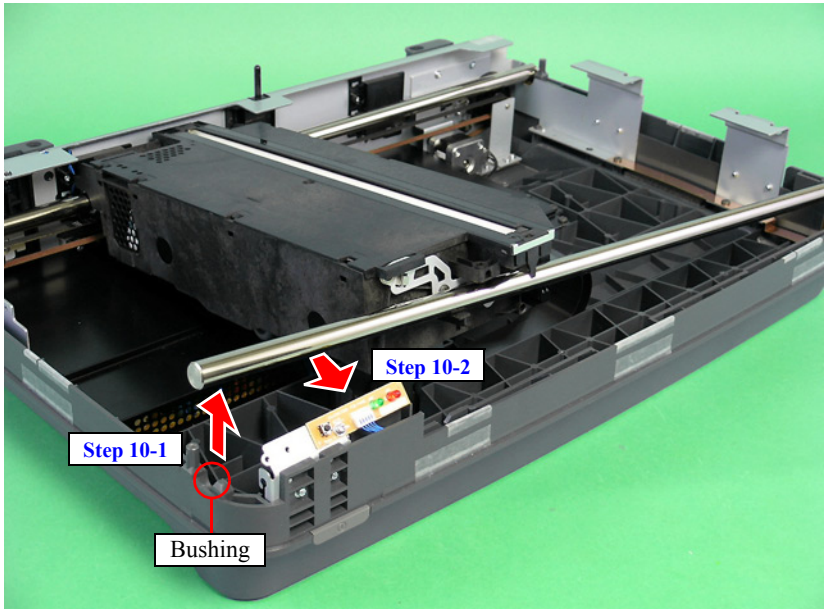


Figure 4-23. Removal of Carriage Shaft A (2)

CAUTION

When doing the following procedure, be fully careful not to damage the Carriage Shaft B by the Rear Frame or something else.

11. Remove the right edge of the Carriage Shaft B from the Bushing and lift the Carriage Unit and the Carriage Shaft B, then pull the Carriage Shaft B out to remove it.

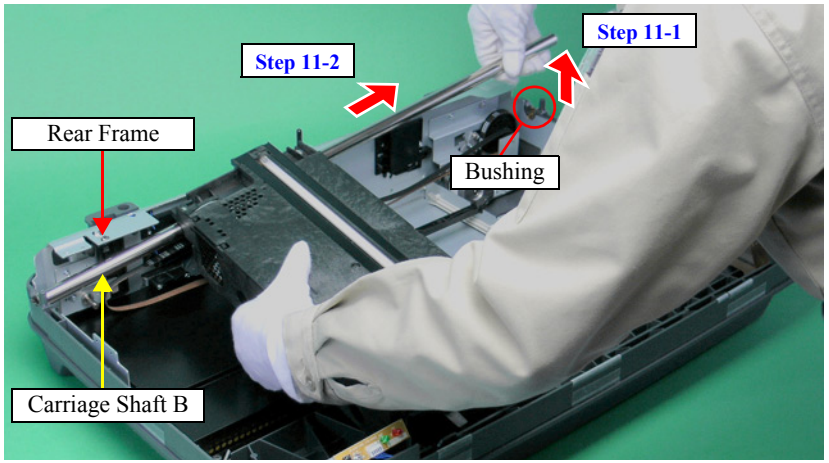


Figure 4-24. Removal of Carriage Shaft B

12. Remove the CR Belt from the Carriage Unit.

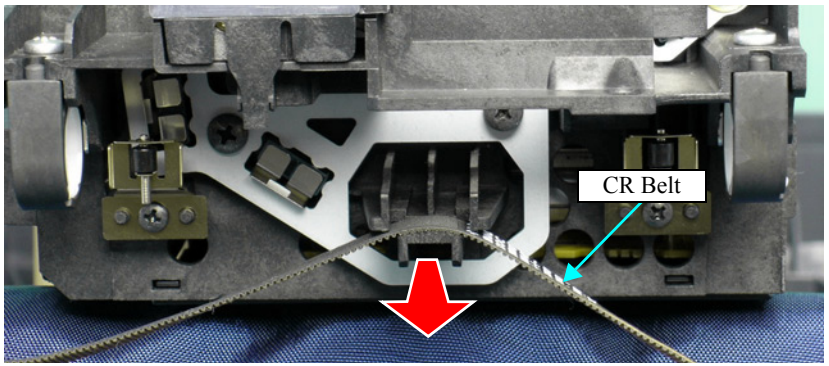


Figure 4-25. Removal of Carriage Unit

4.2.7 Removal of Fan

1. Remove the Power Supply Board Cover.(Refer to 4.2.4 Removal of Power Supply Board Step 1 to Step 7.)
2. Remove the Main Board Cover.(Refer to 4.2.5 Removal of Main Board Step 2 to Step 5.)
3. Release the Fan Connector Cable from the clamps (2 pcs) and then remove the Fan Connector Cable from the Main Board.
4. Remove the two screws (CB SCREW, M3x18) that are securing the Fan, and remove the Fan from the Rear Frame.

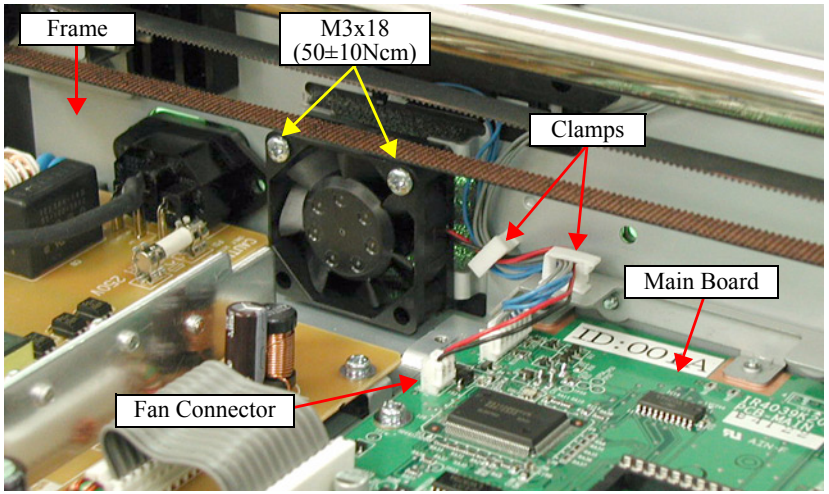


Figure 4-26. Removal of Fan

4.2.8 Removal of Power Switch

1. Remove the Power Switch Connector Cable (2 pcs) from the Power Supply Board.(Refer to 4.2.4 Removal of Power Supply Board Step 1 to Step 8.)
2. Remove the two screws (CBP, M3x8) that are securing the Cover B, and slide the Cover B to remove it in a right oblique direction.

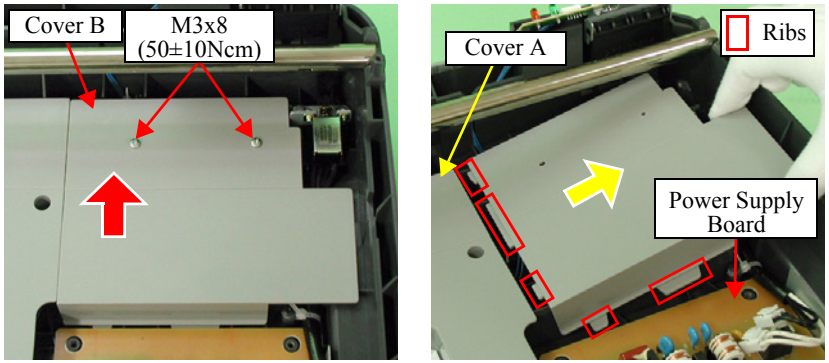


Figure 4-27. Removal of Cover

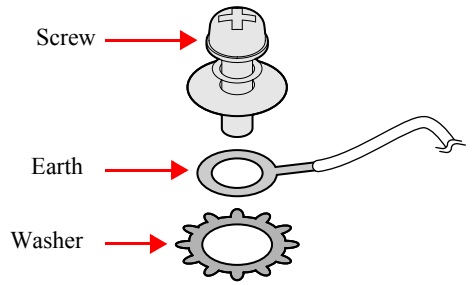
REASSEMBLY

Be sure to put the Rib of the Cover B under the Cover A and Power Supply Board.

3. Remove the one screw (CBP, M3x10) that is securing the Tie Lap, and release the Power Switch Connector Cable.

CAUTION

- **When doing the following procedure, be fully careful not to damage the Carriage Shaft A by the screwdriver.**
- **There is a washer between the Earth and the threaded screw hole. Be sure not to lose the washer.**



4. Remove the two screws (CBP, M4x10) that are securing the Power Switch and Earth Cable, and remove the Power Switch.

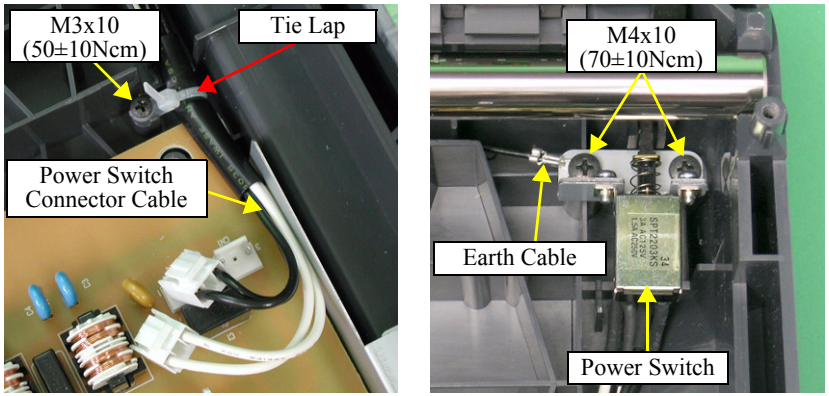


Figure 4-28. Removal of Power Switch

4.2.9 Removal of Panel Board

1. Remove the Housing Upper.(Refer to 4.2.3 Removal of Housing Upper)
2. Remove the one screw (CP(S-P1), M3x6) that is securing the Panel Board.

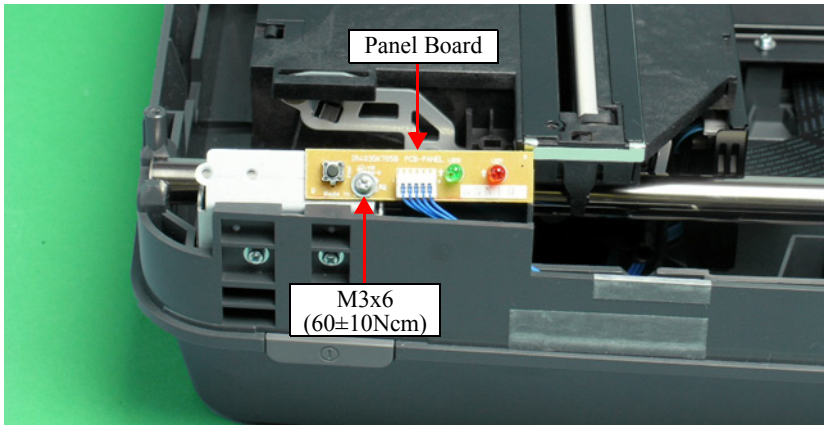


Figure 4-29. Removal of Panel Board (1)

3. Lift the Panel Board a little and remove the Panel Connector Cable from the Panel Board, then remove the Panel Board.

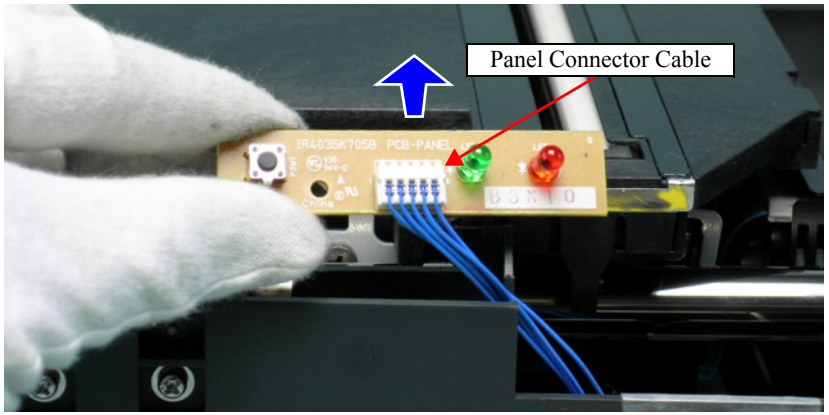


Figure 4-30. Removal of Panel Board (2)

4.2.10 Removal of HP Tension Unit/CR Motor

1. Remove the Carriage Unit.(Refer to 4.2.6 Removal of Carriage Unit and Carriage Shaft A/B)
2. Remove the 9 screws (CB SCREW, M3x8:1 pc, CBP, M3x8:8 pcs) that are securing the Cover A, and remove the Cover A.

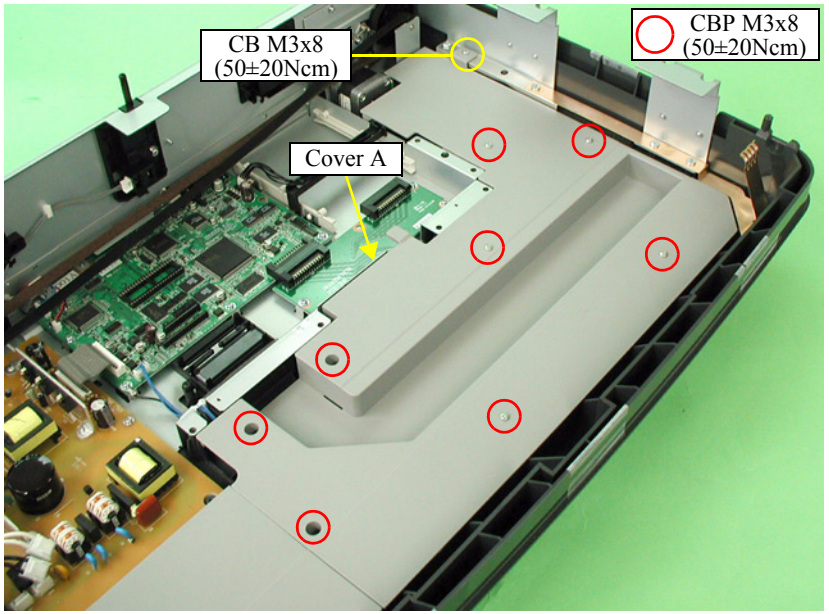


Figure 4-31. Removal of Cover A

3. Disconnect the CR Motor Connector Cable from the CR Motor.
4. Remove the one screw (CP(S-P1), M3x6) that is securing the Pulley Fixing Plate.
5. Pull and remove the Pulley Fixing Plate out of the Shaft.

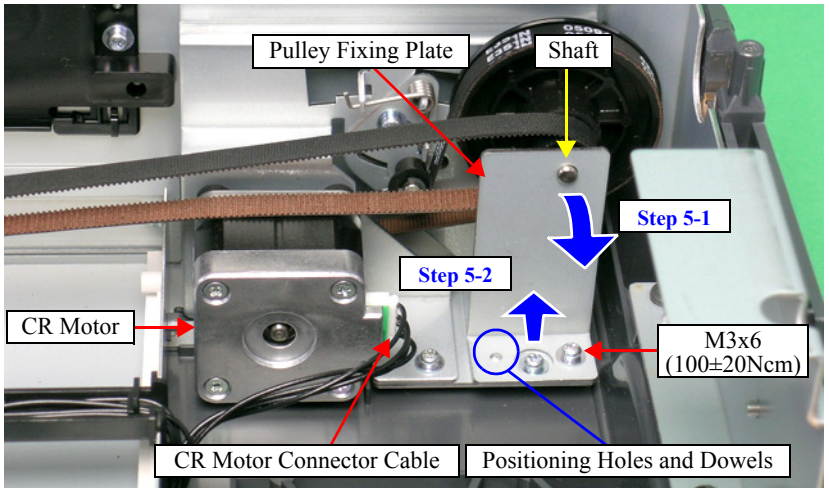


Figure 4-32. Removal of Pulley Fixing Plate

When reinstalling the Pulley Fixing Plate, be sure to match the hole and dowel indicated in *Figure 4-32*.

6. Remove the CR Belt from the Pulley.
7. Remove the four screws (CP(S-P1), M3x6) that are securing the HP Tension Unit, and remove the HP Tension Unit.

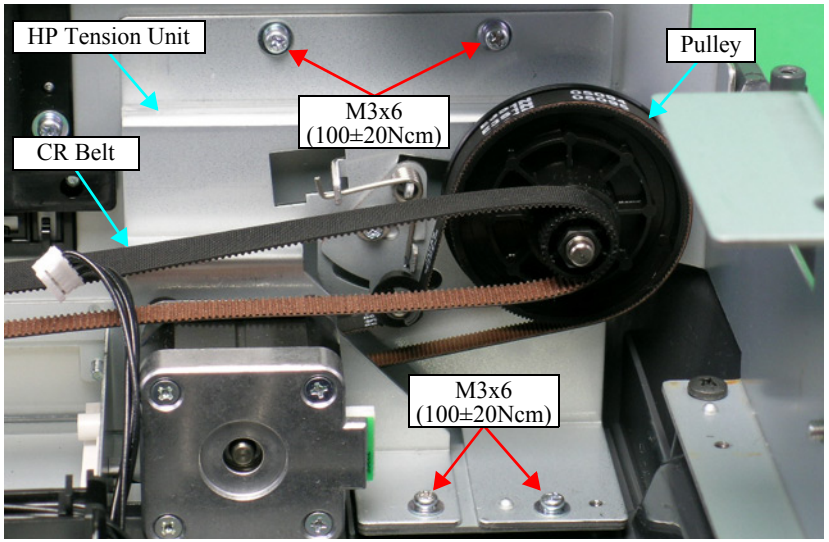


Figure 4-33. Removal of CR Belt/HP Tension Unit

8. Remove the four screws (M3x10) that are securing the CR Motor, and remove the CR Motor.
9. Remove the Motor Belt from the HP Tension Unit.

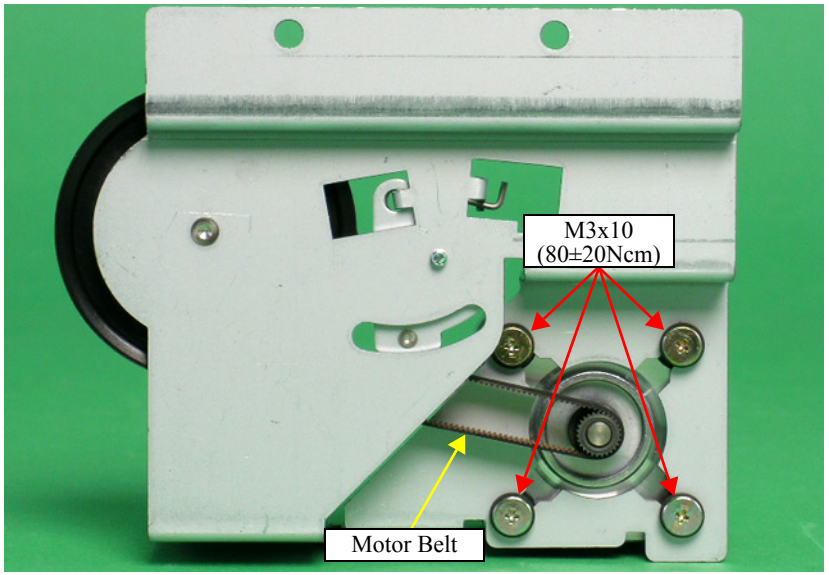
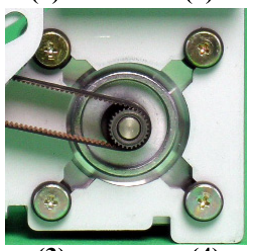


Figure 4-34. Removal of CR Motor and Motor Belt

REASSEMBLY

When reinstalling the CR Motor screws, tighten them in order of (1), (2), (3) and (4).



4.2.11 Removal of Open/Close Sensor Unit

1. Remove the Carriage Unit.(Refer to 4.2.6 Removal of Carriage Unit and Carriage Shaft A/B)
2. Disconnect the Open/Close Sensor Connector Cable.
3. Remove the one screw (CP(S-P2), M4x10) that is securing the Open/Close Sensor Unit, and slide down and remove the Open/Close Sensor Unit.

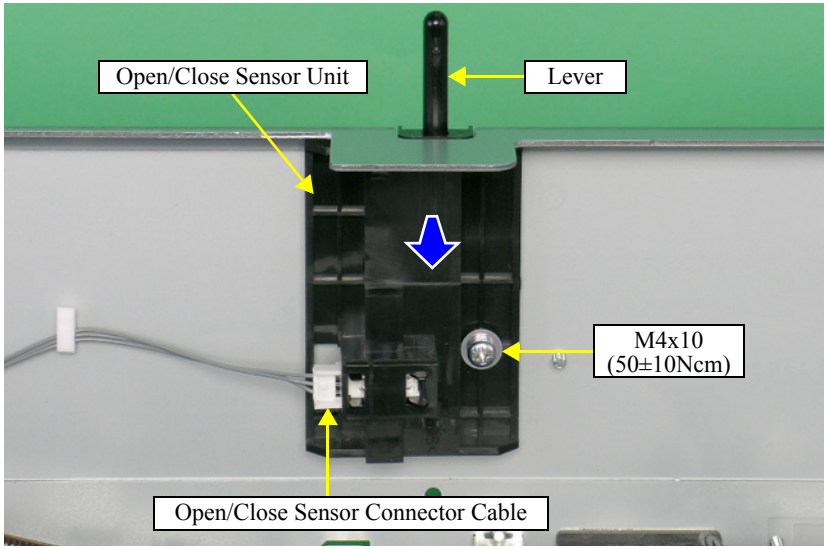
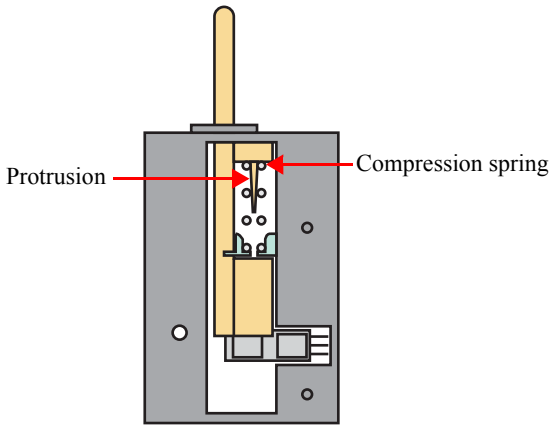


Figure 4-35. Removal of Open/Close Sensor Unit

CAUTION

There is a compression spring behind the Open/Close Sensor Unit. The compression spring may come off when operating the lever while the Open/Close Sensor is removed from the frame. If this happens, attach the compression spring correctly with reference to the figure below.



4.2.12 Disassembly of TPU

4.2.12.1 Removal of TPU Lower Housing

1. Release the TPU Carriage lock.

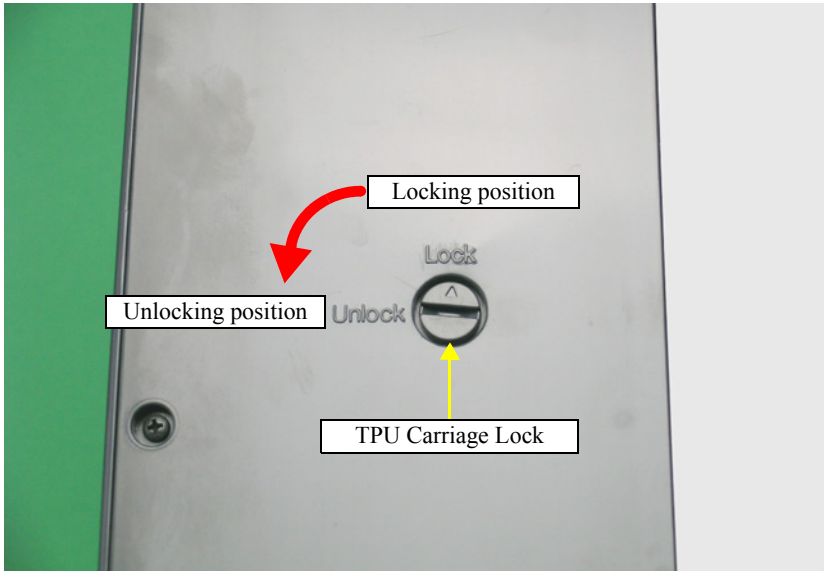


Figure 4-36. Release of TPU Carriage Lock

After reinstalling the TPU Lower Housing, be sure to lock the TPU Carriage Lock.

2. Remove the eight screws (CB SCREW, M3x6:4 pcs, CBP, M3x10:4 pcs) that are securing the TPU Lower Housing.
3. Lift and remove the TPU Lower Housing.

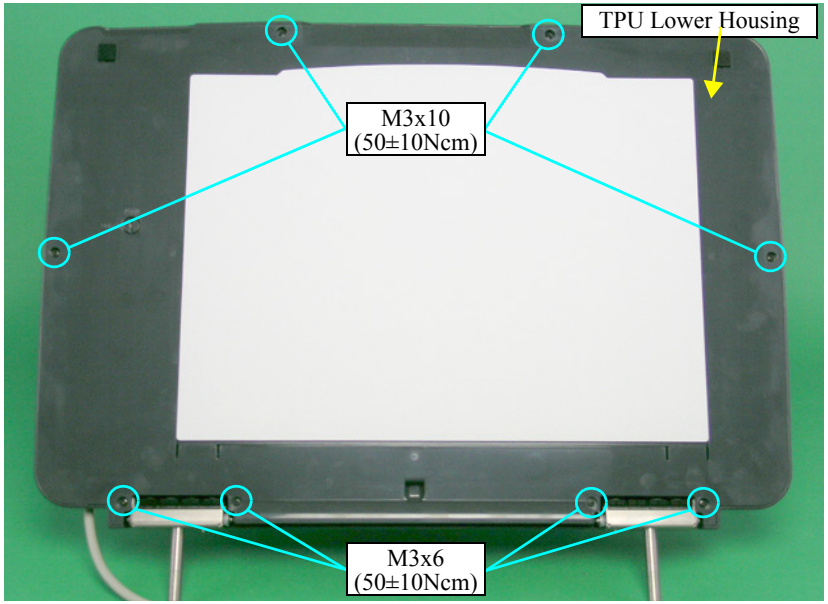


Figure 4-37. Removal of TPU Lower Housing

4.2.12.2 Removal of TPU Carriage Lock

1. Remove the TPU Lower Housing.(Refer to 4.2.12.1 Removal of TPU Lower Housing)
2. Remove the one screw (CBP, M3x10) that is securing TPU Carriage Lock, and remove the TPU Carriage Lock.

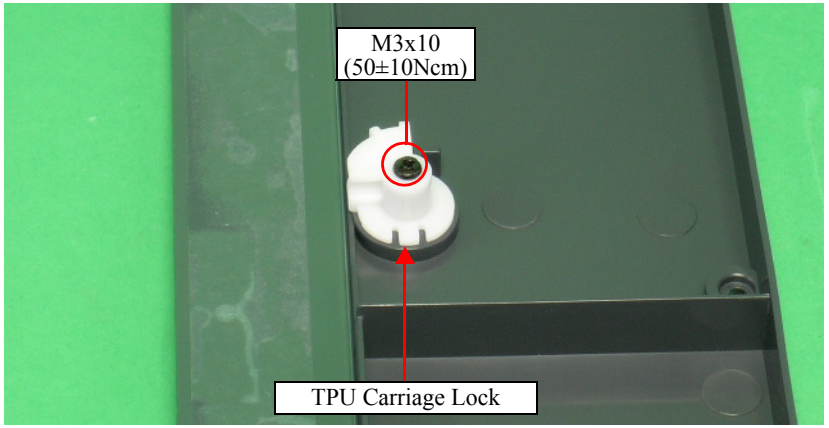
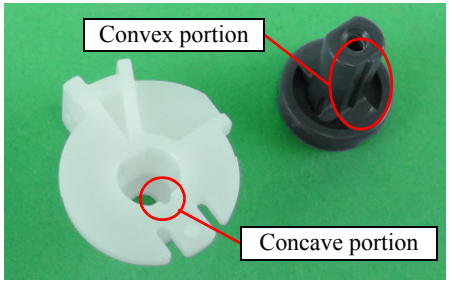


Figure 4-38. Removal of TPU Carriage Lock

REASSEMBLY

When reinstalling the TPU Carriage Lock, be sure to match the concavity and convexity.



4.2.12.3 Removal of TPU Main Board

1. Remove the TPU Lower Housing.(Refer to 4.2.12.1 Removal of TPU Lower Housing)
2. Move the TPU Carriage Unit to the center.

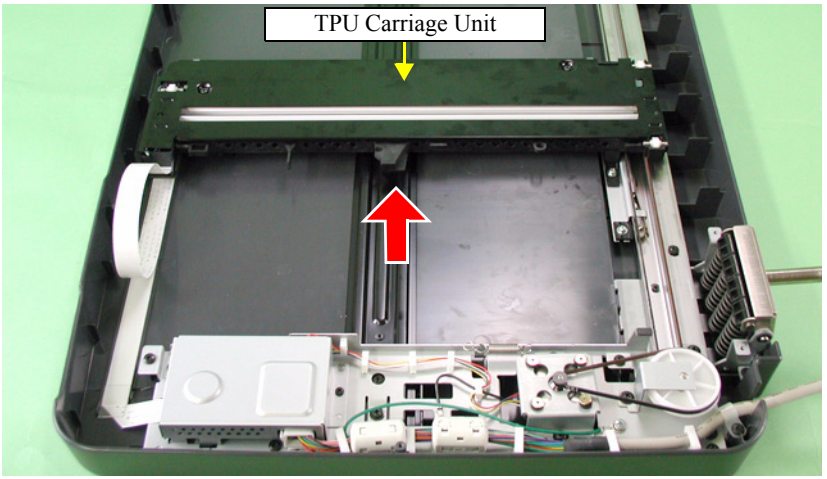


Figure 4-39. Movement of TPU Carriage Unit

3. Remove the two screws (CB SCREW, M3x6) that are securing the TPU Main Board Cover.

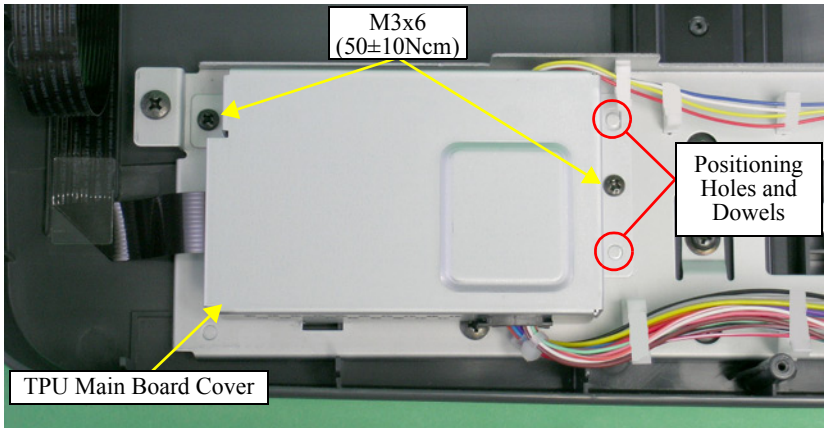


Figure 4-40. Removal of TPU Main Board Cover (1)

4. Unhook the TPU Main Board Cover hook, and lift the Cover a little to remove the TPU CR Motor Connector Cable from the Edge Saddle, then remove the TPU Main Board Cover.

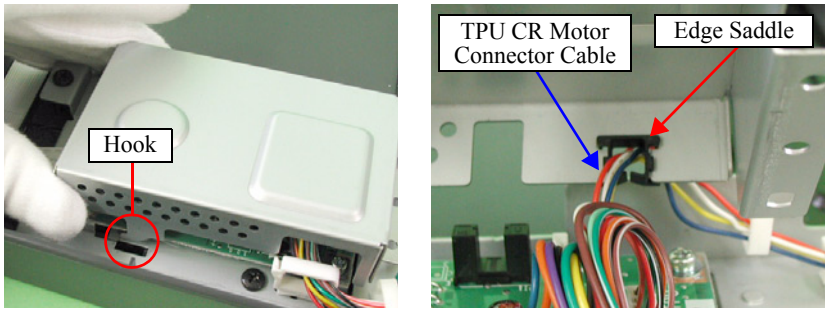


Figure 4-41. Removal of TPU Main Board Cover (2)

When reinstalling the TPU Main Board Cover, be sure to match the holes and dowels indicated in *Figure 4-40*.

5. Remove the Connector Cable and FFC shown in Figure 4-42 from the TPU Main Board.

   CN5 : TPU CR Motor Connector Cable
   CN1/CN2: OPTION I/F Connector Cable (2 psc)
   CN4: TPU Carriage FFC

6. Remove the four screws (CP(S-P1), M3x6) that are securing the TPU Main Board, and remove the TPU Main Board.

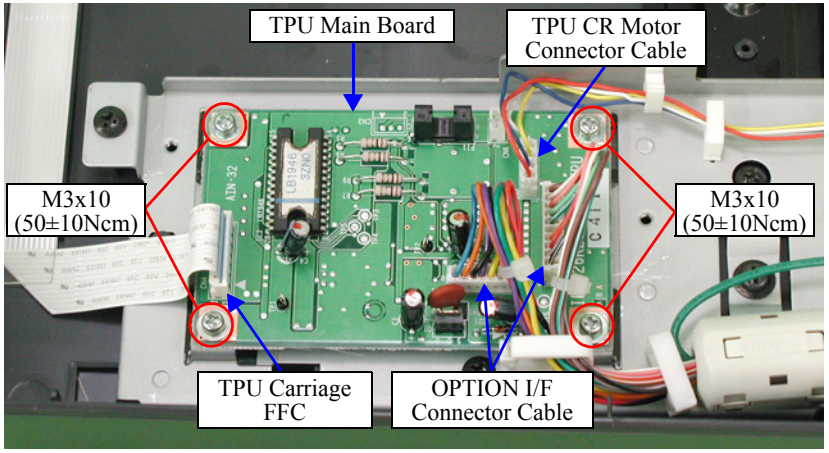


Figure 4-42. Removal of TPU Main Board

4.2.12.4 Removal of OPTION I/F Connector Cable

1. Remove the OPTION I/F Connector Cable (2 pcs) from the TPU Main Board. (Refer to 4.2.12.3 Removal of TPU Main Board Step 1 to Step 5.)
2. Remove the OPTION I/F Connector Cable from the clamps (6 pcs).
3. Remove the two screws (CB SCREW, M4x6:1 pc, CBP, M4x10:1 pc) that are securing the Earth Cable and Tie Lap, and remove the OPTION I/F Connector Cable.

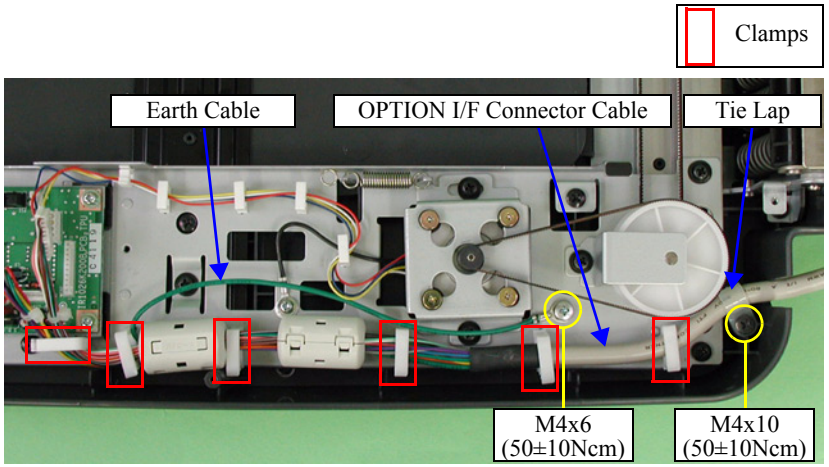


Figure 4-43. Removal of OPTION I/F Connector Cable

4.2.12.5 Removal of TPU CR Motor Belt/TPU CR Motor

1. Move the TPU Carriage Unit to the center. (Refer to 4.2.12.3 Removal of TPU Main Board Step 1 to Step 2.)
2. Disconnect the TPU CR Motor Connector Cable from the TPU CR Motor.
3. Pull the A portion of the extension spring in a direction of the arrow, and release it from the two hooks of the Fixing Plate A, then remove the extension spring.

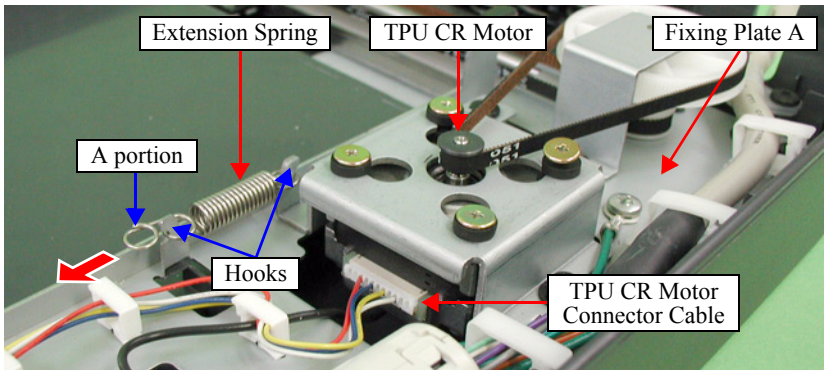


Figure 4-44. Removal of TPU CR Motor Connector/Extension Spring

4. Remove the two screws (CP(S-P2), M4x8) that are securing TPU CR Motor Unit.

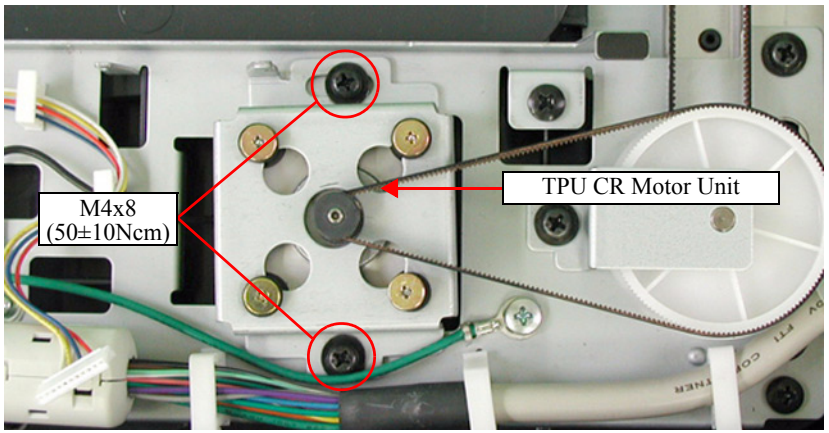


Figure 4-45. Removal of Screws of TPU CR Motor Unit (2)

5. Slide the TPU CR Motor Unit in a direction of the arrow, then make the TPU CR Motor Belt bow and remove it.

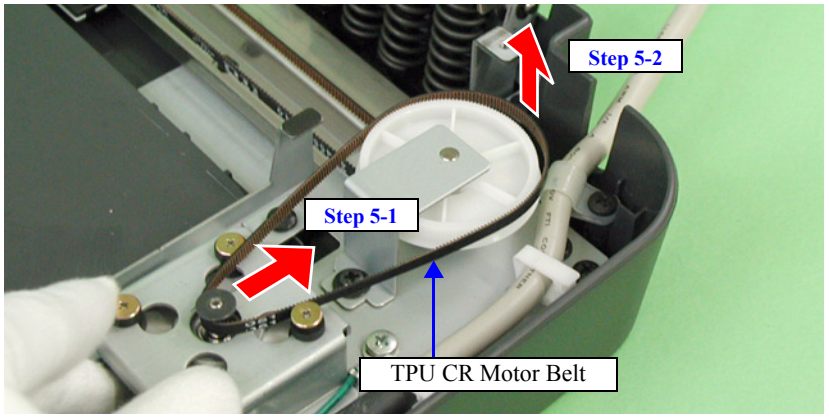


Figure 4-46. Removal of TPU CR Motor Belt

6. Lift the TPU CR Motor Unit, and remove the one screw (CP, M3x4) that is securing the Earth Cable, then remove the TPU CR Motor Unit.
7. Remove the four screws (M3x10) that are securing the TPU CR Motor, and remove the TPU CR Motor.

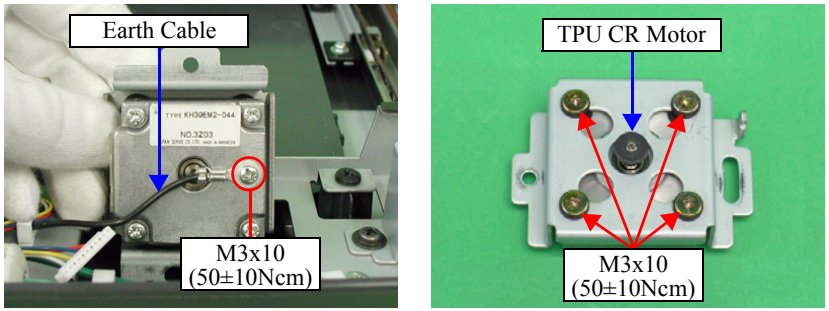
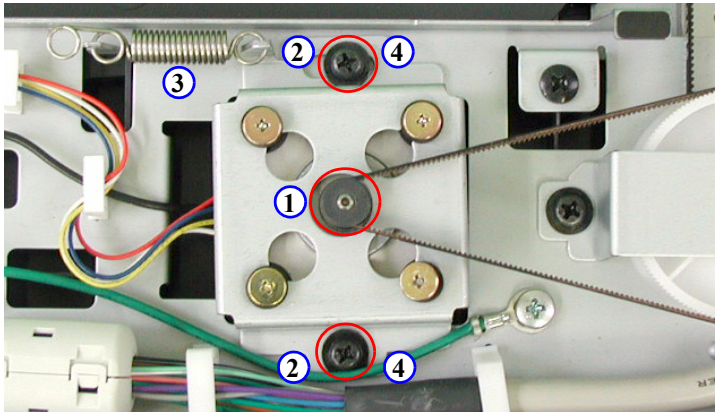


Figure 4-47. Removal of TPU CR Motor

When reinstalling the CR Motor screws, install them in the following order.

1. **Put the CR Motor Belt on the Pinion Gear.**
2. **Tighten the screw tentatively.**
3. **Install the Extension Spring.**
4. **Tighten the screws.**



4.2.12.6 Removal of TPU Carriage Unit

1. Move the TPU Carriage Unit to the center. (Refer to 4.2.12.3 Removal of TPU Main Board Step 1 to Step 2.)
2. Remove the two screws (CBP, M3x10) that are securing TPU Carriage Cover, and remove the TPU Carriage Cover.

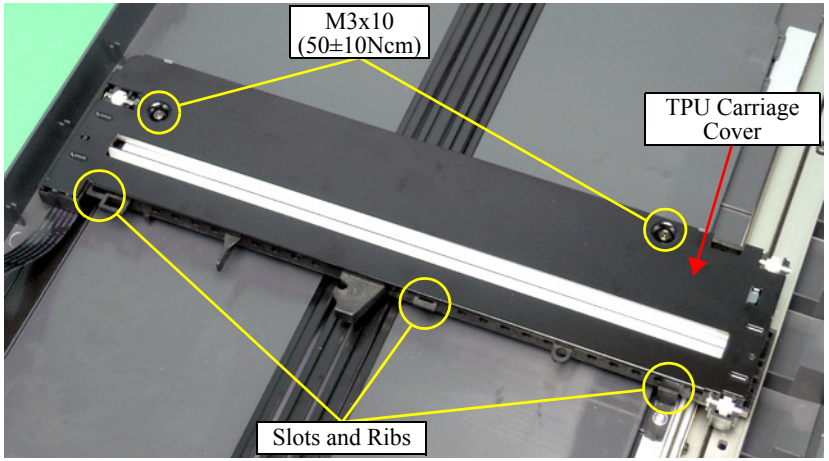


Figure 4-48. Removal of Carriage Cover

REASSEMBLY

When reinstalling the TPU Carriage Cover, be sure to insert the three Ribs of the TPU Carriage Cover shown in *Figure 4-48* into the Slots of the TPU Carriage Unit.

3. Remove the one screw (CBP, M3x6) that is securing the Timing Belt Retainer, and remove the Timing Belt Retainer.

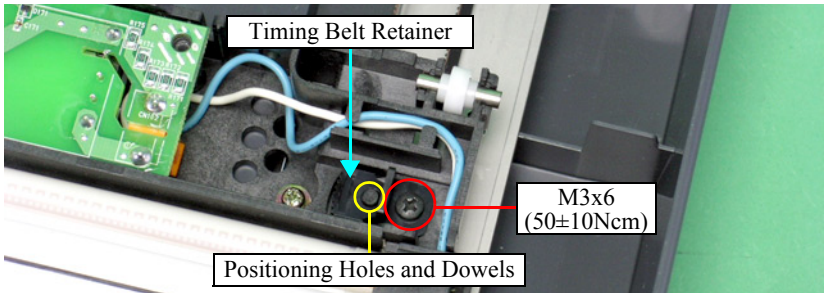
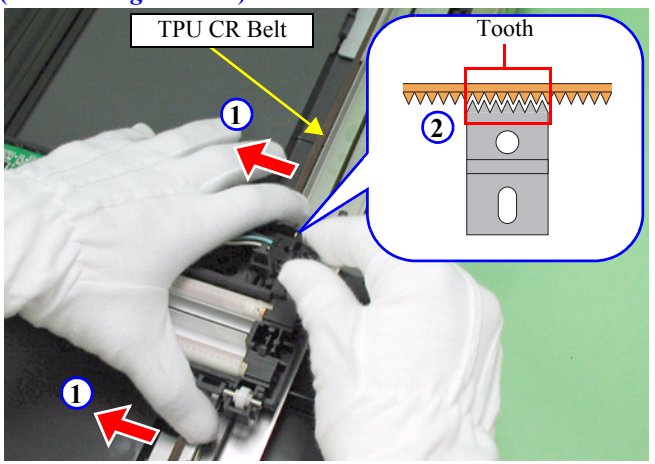


Figure 4-49. Removal of Timing Belt Retainer

REASSEMBLY

When reinstalling the Timing Belt Retainer, do it in the following order.

1. **Pull the TPU CR Belt by hand to prevent the Belt from twisting.**
2. **Match the both tooth of the Timing Belt Retainer and the TPU CR Belt.**
3. **Match the Positioning Holes and Dowels. (Refer to *Figure 4-49*)**
4. **Secure the Retainer with a screw. (Refer to *Figure 4-49*)**



4. Remove the TPU CR Belt from the Carriage Guide, then lift the TPU Carriage Unit to remove it.

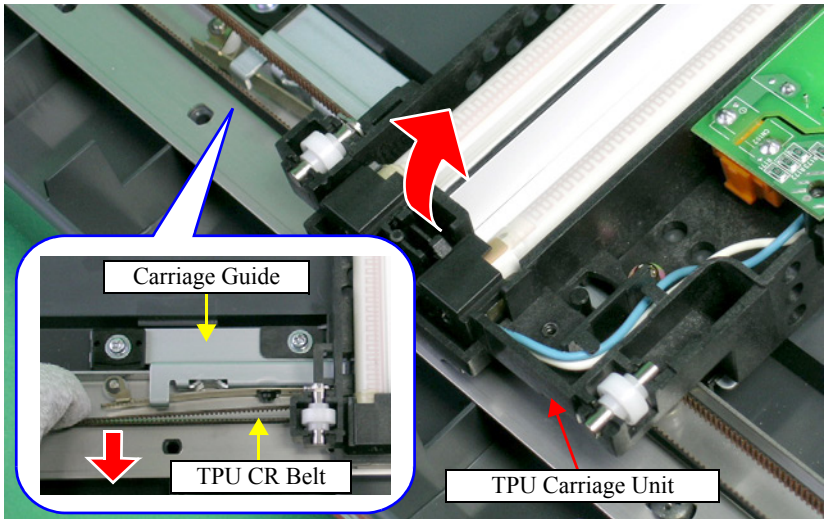
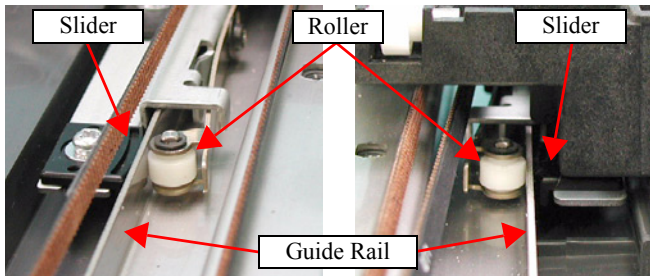


Figure 4-50. Removal of TPU Carriage Unit

REASSEMBLY

When reinstalling the TPU Carriage Unit, be sure to catch the Guide Rail between the Rollers of Carriage Guide and the Slider.



5. Remove the seven Ribs of the Cable Fixing Film and remove the Cable Fixing Film.
6. Remove the Carriage FFC from the TPU Inverter Board, and release the Carriage FFC from the two Guides and remove it.

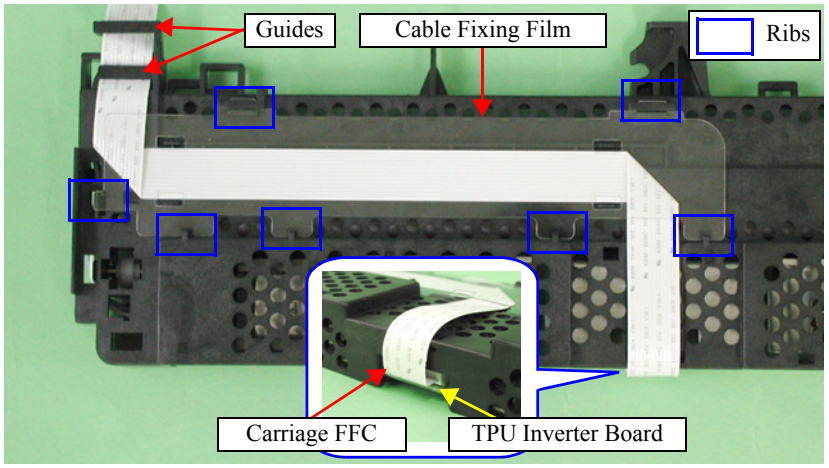


Figure 4-51. Removal of Carriage FFC

7. Remove the two screws (CP(S-P1), M3x6, CP(S-P2), M3x12) that are securing the Carriage Guides and remove the Carriage Guides.

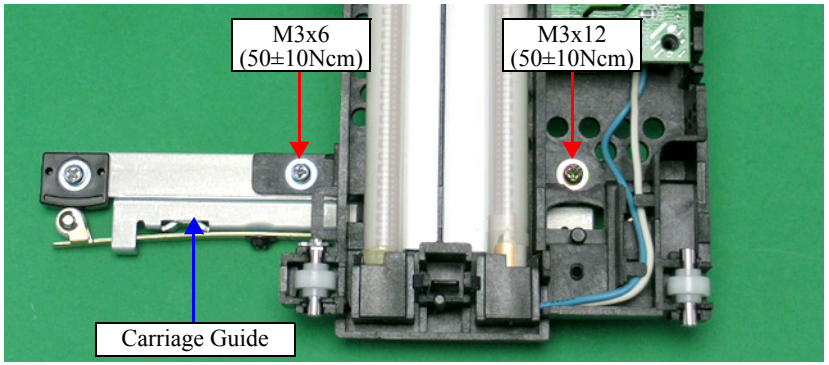
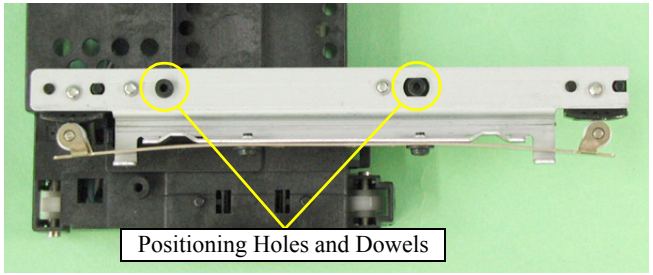


Figure 4-52. Removal of Carriage Guide

REASSEMBLY

When reinstalling the Carriage Guides, be sure to match the holes and dowels.



4.2.12.7 Removal of TPU Inverter Board/Lamp

1. Remove the TPU Carriage Cover.(Refer to 4.2.12.6 Removal of TPU Carriage Unit Step 2
2. Remove the Carriage FFC from the TPU Inverter Board.
3. Remove the three screws (CP(O), M3x6) that are securing the TPU Inverter Board.
4. Slide the TPU Inverter Board until its Ribs match the notches of the Frame, and release the Board from the two Ribs of the Carriage Frame.

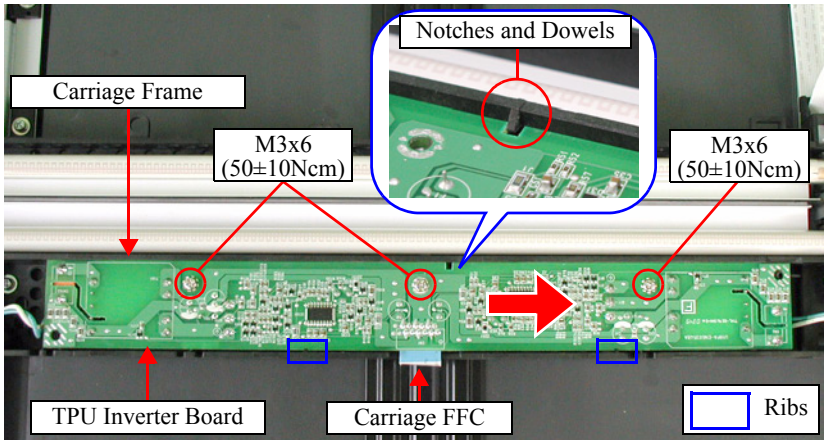


Figure 4-53. Removal of TPU Inverter Board (2)

5. Lift the TPU Inverter Board and remove the Lamp Connector Cables at the both sides, then remove the TPU Inverter Board.

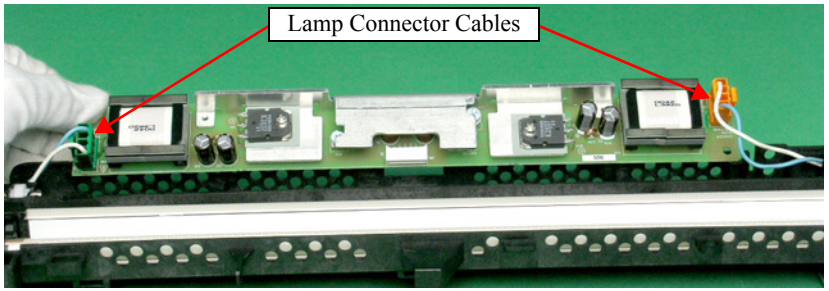


Figure 4-54. Removal of TPU Inverter Board (2)

6. Remove the Lamp Connector Cables at both sides from the Guides.
7. Release the four hooks that are securing both edges of Lamps, and remove the Lamp one by one.

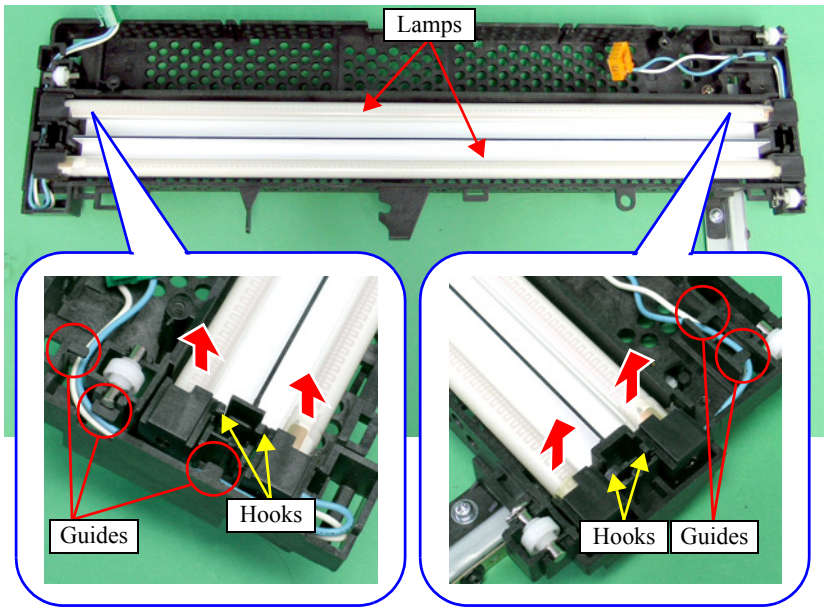


Figure 4-55. Removal of Lamp

4.2.12.8 Removal of TPU CR Belt

1. Remove the TPU CR Motor Belt. (Refer to 4.2.12.5 Removal of TPU CR Motor Belt/TPU CR Motor Step 5
2. Remove the TPU Carriage Unit. (Refer to 4.2.12.6 Removal of TPU Carriage Unit)
3. Pull the A portion of the Extension Spring in a direction of the arrow, and release it from the two hooks of the Pulley Unit, then remove the Extension Spring.
4. Remove the one screw (CC SCREW, M4x6) that is securing the Pulley Unit, and remove the Pulley Unit.

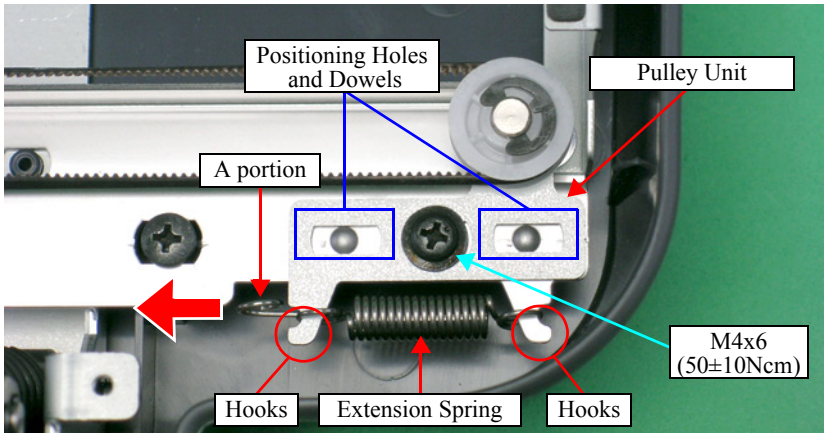


Figure 4-56. Removal of Pulley Unit

REASSEMBLY

Reinstall the Pulley Unit in the following order.
(Refer to *Figure 4-56*)

1. **Match the Positioning Holes and Dowels.**
2. **Tighten the screws tentatively.**
3. **Install the Extension Spring.**
4. **Tighten the screws.**

5. Remove the one screw (CC SCREW, M4x6) that is securing the Pulley Fixing Plate, and remove the Pulley Fixing Plate and the Pulley.
6. Remove the TPU CR Belt.

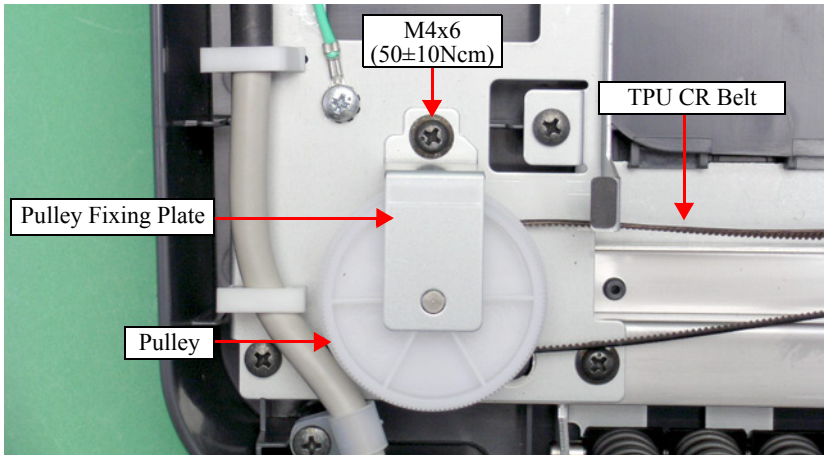


Figure 4-57. Removal of TPU CR Belt

4.2.12.9 Removal of Hinges

1. Remove the TPU Main Board. (Refer to 4.2.12.3 Removal of TPU Main Board)
2. Remove the OPTION I/F Connector Cable. (Refer to 4.2.12.4 Removal of OPTION I/F Connector Cable)
3. Remove the TPU CR Motor. (Refer to 4.2.12.5 Removal of TPU CR Motor Belt/ TPU CR Motor)
4. Remove the TPU CR Belt. (Refer to 4.2.12.8 Removal of TPU CR Belt)
5. Remove the screw (CP(S-P1), M4x6) that is securing the Earth Cable.
6. Remove the TPU CR Motor Connector Cable and the Earth Cable from the clamps (5 pcs).

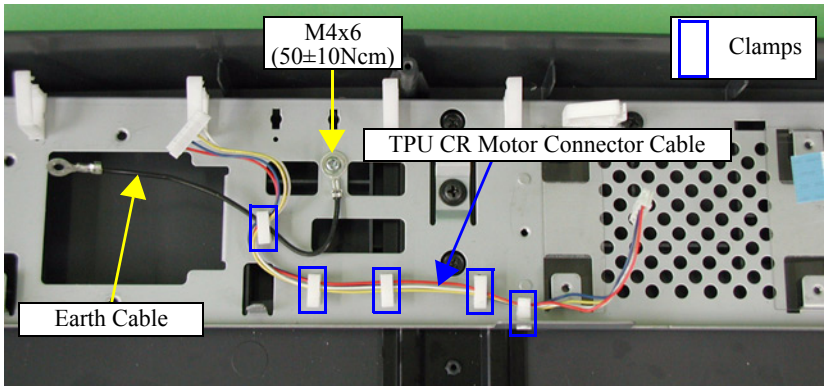


Figure 4-58. Removal of Earth Cable/TPU CR Motor Connector Cable

7. Remove the seven screws (CBP, M4x10:4 pcs, CC SCREW, M4x6:3 pcs) that are securing the Fixing Plate A, and remove the Fixing Plate A.

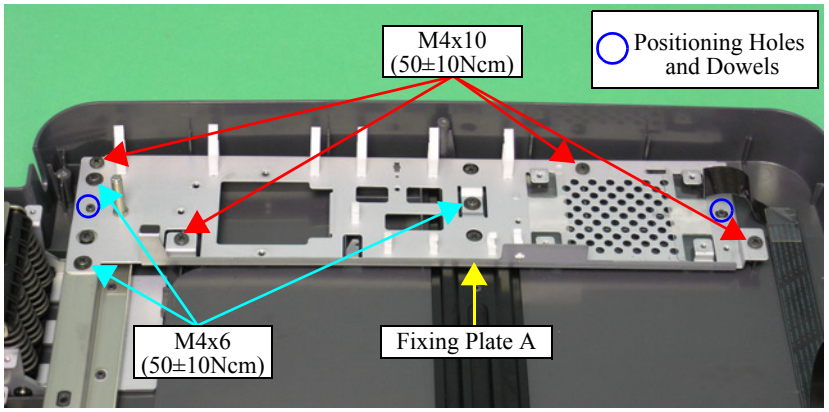


Figure 4-59. Removal of Fixing Plate A

8. Remove the five screws (CBP, M4x10:4 pcs, CC SCREW, M4x6: 1 pc) that are securing the Frame A, and remove the Frame A.

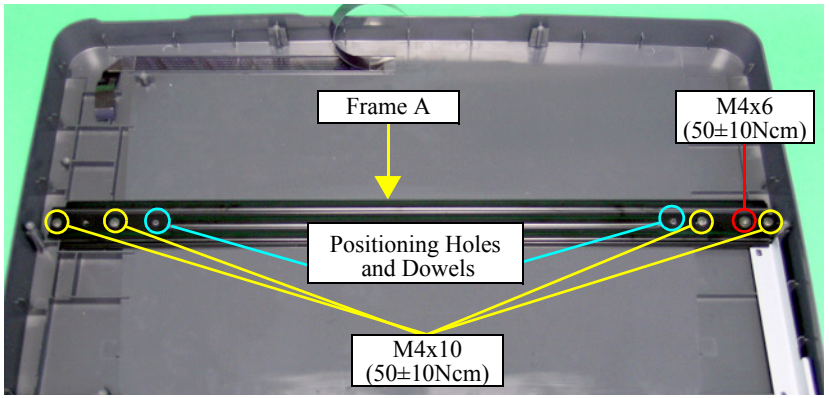


Figure 4-60. Removal of Frame A

9. Remove the one screw (CC SCREW, M4x5) that is securing the Fixing Plate B, and remove the Fixing Plate B.

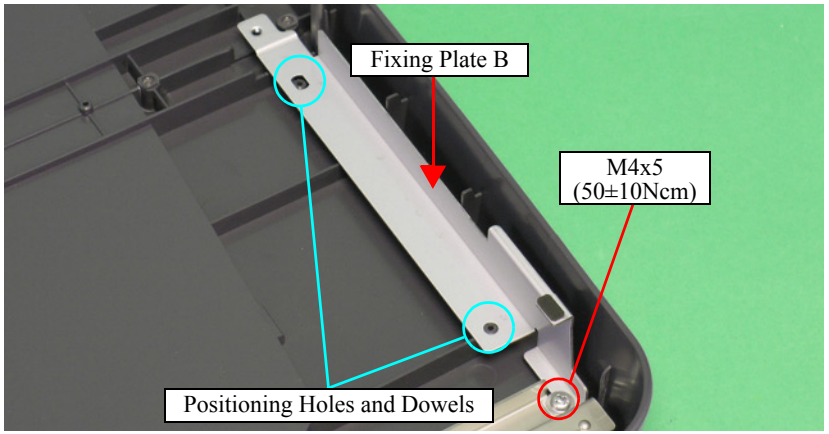


Figure 4-61. Removal of Fixing Plate B

10. Remove the four screws (CBP, M4x10) that are securing the Guide Rail, and remove the Guide Rail.

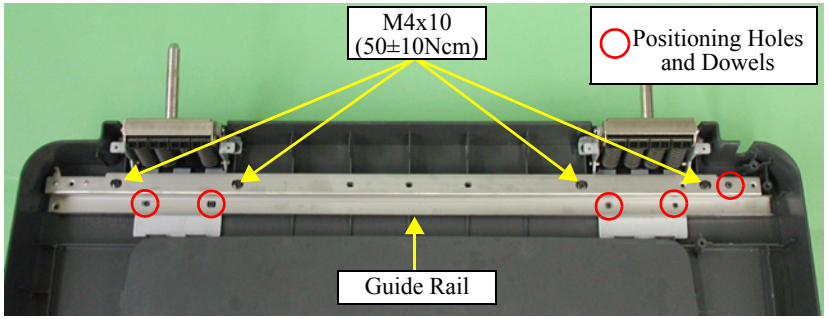


Figure 4-62. Removal of Guide Rail

11. Remove the two screws (CBP M4 x 10) that are securing each of the Hinges, and remove both Hinges.

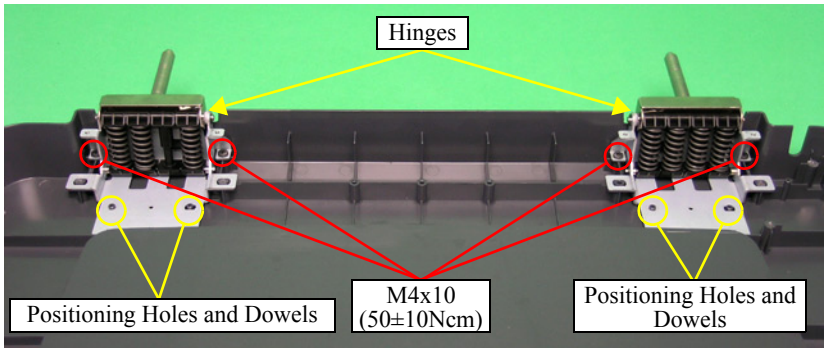


Figure 4-63. Removal of Hinges

REASSEMBLY

- **When reinstalling the Hinges, be sure to match the holes and dowels indicated in *Figure 4-63*.**
- **When reinstalling the Guide Rails, be sure to match the holes and dowels indicated in *Figure 4-62*.**
- **When reinstalling the Fixing Plate B, be sure to match the holes and dowels indicated in *Figure 4-61*.**
- **When reinstalling the Frame A, be sure to match the holes and dowels indicated in *Figure 4-60*.**
- **When reinstalling the Fixing Plate A, be sure to match the holes and dowels indicated in *Figure 4-59*.**

CHAPTER

5

ADJUSTMENT

5.1 Overview

This chapter explains the method of Firm Ware update that is required for the scanner.

5.1.1 Required Files

Files that are required to update the F/W are as follows.

Table 5-1. Required Files

Name	Description
Mem4039.EXE	Software to execute the update
aspiscan.dll	Update file

5.1.2 Update Procedure

5.1.2.1 Supported OS

Windows2000 and Windows98 only.

5.1.2.2 Supported I/F

USB I/F only.

5.1.2.3 How to Install F/W Updater

Copy folder FW Update Tool which contains Mem4039.exe and Aspiscan.dll to a known location in your PC. This folder contains the Firmware updater program.
Copy folder v007 which contains v007.mot to another known location in your PC. This folder contains the update firmware v007.

5.1.3 Instruction for F/W Updater

5.1.3.1 Preparation

1. Install R4CD180 driver (EpsonScan).
2. Connect power ON scanner to PC via USB I/F. The step1 may not be needed if drivers has been installed.
3. In the Control Panel, open Scanner and Camera property of Expression 10000XL.
4. Disable device events by checking the check box.

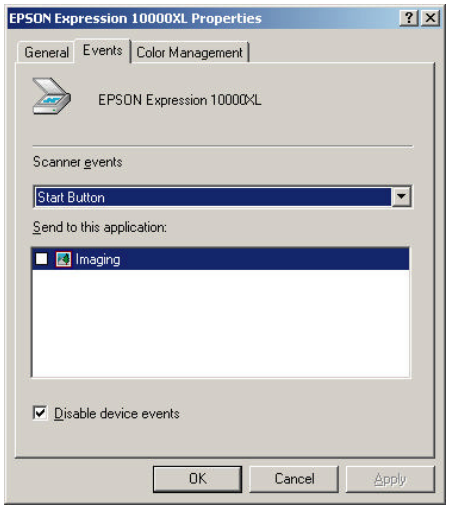


Figure 5-1. Preparation for installation

5. Reboot PC.

CAUTION

Be sure to do the above setting before using the application.

5.1.3.2 How to Use F/W Updater

1. After reboot, ensure the USB is connected R4CD180 to PC via USB.
2. Launch Mem4039.exe. The program as below.
3. In the Download File, select v007.mot as above. Leave the other icons and values unchanged (keep the default settings).
4. Click the Download button. The status bar will be displayed to indicate the progress of the update.
5. A dialog box will open to show checksum as Ox1A73.
6. Once completed, Power off and Power on the scanner.

CHAPTER

6

MAINTENANCE

6.1 Overview

This chapter explains the maintenance work.

6.1.1 Cleaning

When the scanner shows dirt, clean it with care. Special care must be taken when cleaning the Document Glass since it affects the quality of image scanning.

CAUTION

Never use organic solvents, such as thinner and benzene, because they may deteriorate or degrade the plastic and rubber parts.

- Exterior
  After wetting a clean cloth with water and then completely squeezing water out of it, wipe the exterior with that close. If the exterior is extremely dirty, wipe it with a cloth moistened with a small amount of neutral detergent.

- Document Glass
  Clean it with a clean, dry cloth. When the Document Glass is especially dirty or has foreign matter on its surface, wipe it with a cloth moistened with a small amount of pure water. If the Document Glass has traces of wiping after cleaning, completely wipe it with a dry, clean cloth again.

- Scanner inside
  When the Upper Housing has been removed, much dirt and dust enter from the outside. Therefore, reinstall the Upper Housing after fully air-blowing the scanner inside and Upper Housing.

6.1.2 Lubrication

Lubrication is required when any part of the Carriage Unit of the scanner has been replaced or the Carriage moves with noticeably large operation noise. The specified grease is indicated in *Table 6-1*, and the lubrication points are shown in *Figure 6-1*.

Table 6-1. Specified Grease

Type	Name	Part Number	Registration Code	Supplier
Antifriction	G-46	PD910	1039172	EPSON

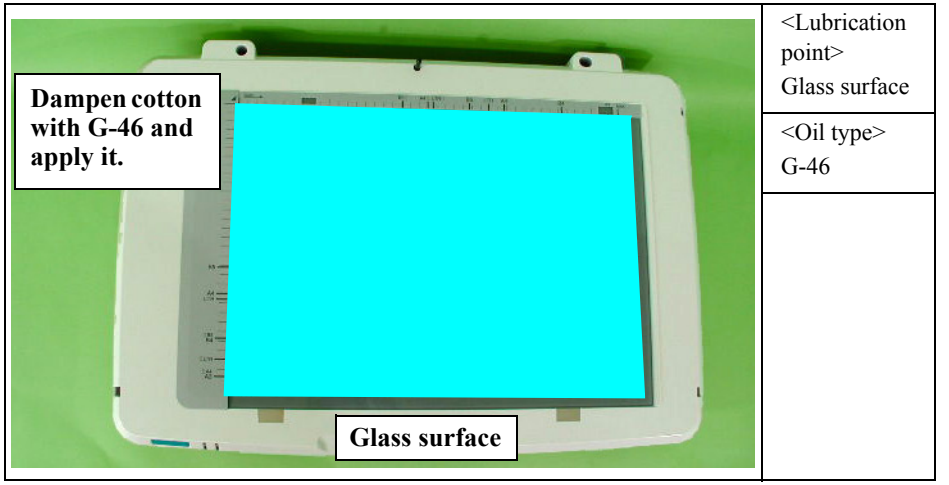


Figure 6-1. Lubrication Points

CAUTION

Note that a failure to strictly observe the specified amount of application will contaminate the mechanisms or lead to a malfunction.

CHAPTER

7

APPENDIX

7.1 Connector Connection

The following table indicates the connector signal wiring on each electrical circuit board of this scanner.

7.1.1 Connector Layout

Board	Connector	Description	Number of Pins
Main Board	CN1	CCD Sensor Board	40
	CN2	CR Motor	4
	CN3	Open/Close Sensor/HP Sensor	6
	CN4	Power Supply Board	12
	CN5	Fan	2
	CN6	Panel Board	5
	CN7	IEEE1394	6
	CN8	Sub Board	50
	CN11	OPTION	26
	CN12	USB	4
	CN13	CCD Sensor Board	30
Sub Board	CN1	Main Board	50
	CN2	IEEE1394	50
Power Supply Board	CN1	Power Switch	2
	CN2	Main Board	12
	CN3	AC Inlet	3
	CN4	Power Switch	2
Inverter Board	CN1	CCD Sensor Board	5
	CN2	Lamp	2
CCD Board	CN1	Main Board	40
	CN2	Inverter Board	5
	CN3	HP Sensor	5
	CN4	AF Motor	4
	CN5	Main Board	30
	CN6	HP Sensor	3
Panel Board	CN1	Main Board	5
TPU Main Board	CN1	Main Board	8
	CN2	Main Board	9
	CN4	Inverter Board	12
	CN5	CR Motor	4
TPU Inverter Board	CN1	TPU Main Board	12
	CN2	Lamp	2
	CN102	Lamp	2

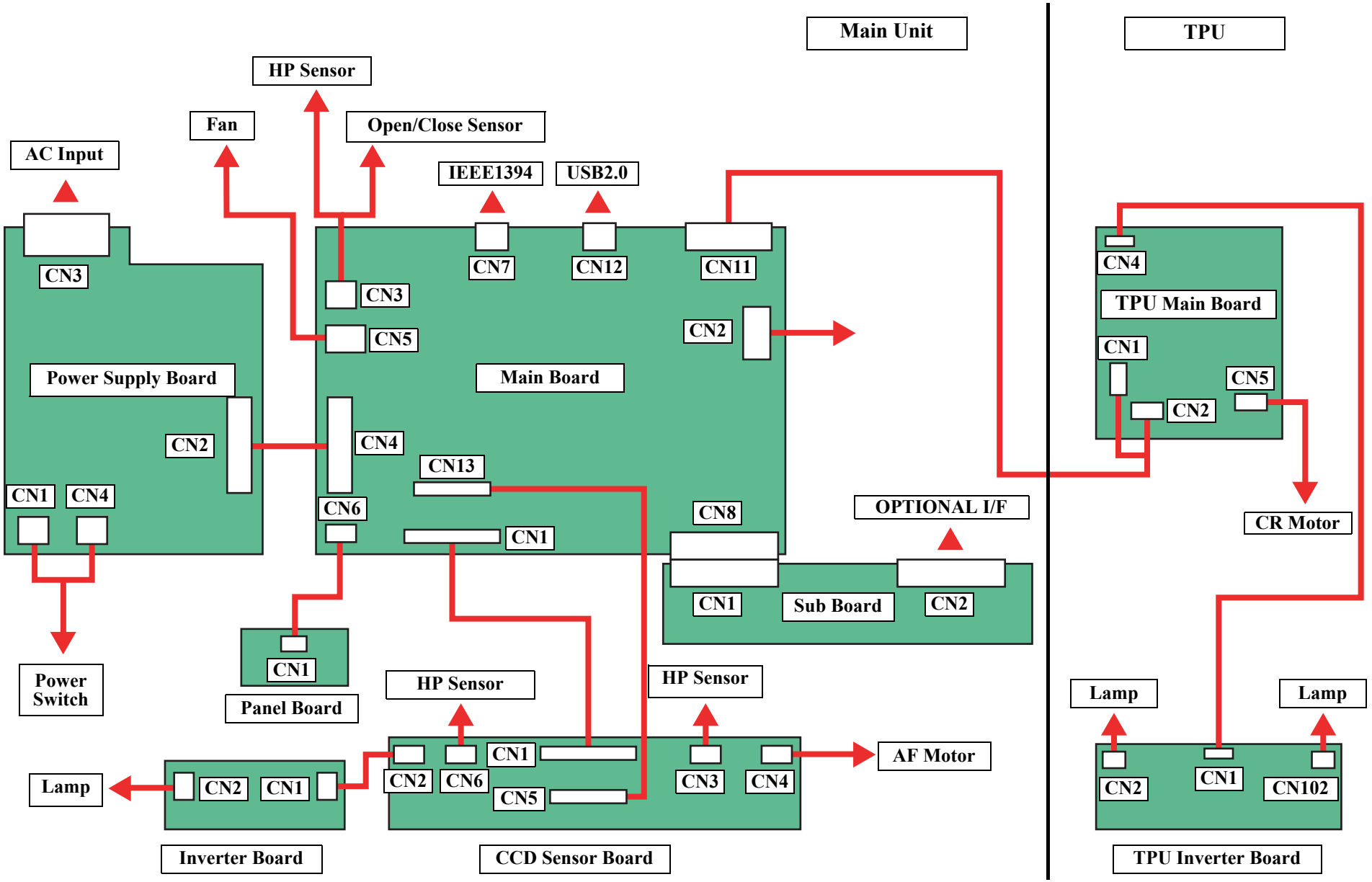
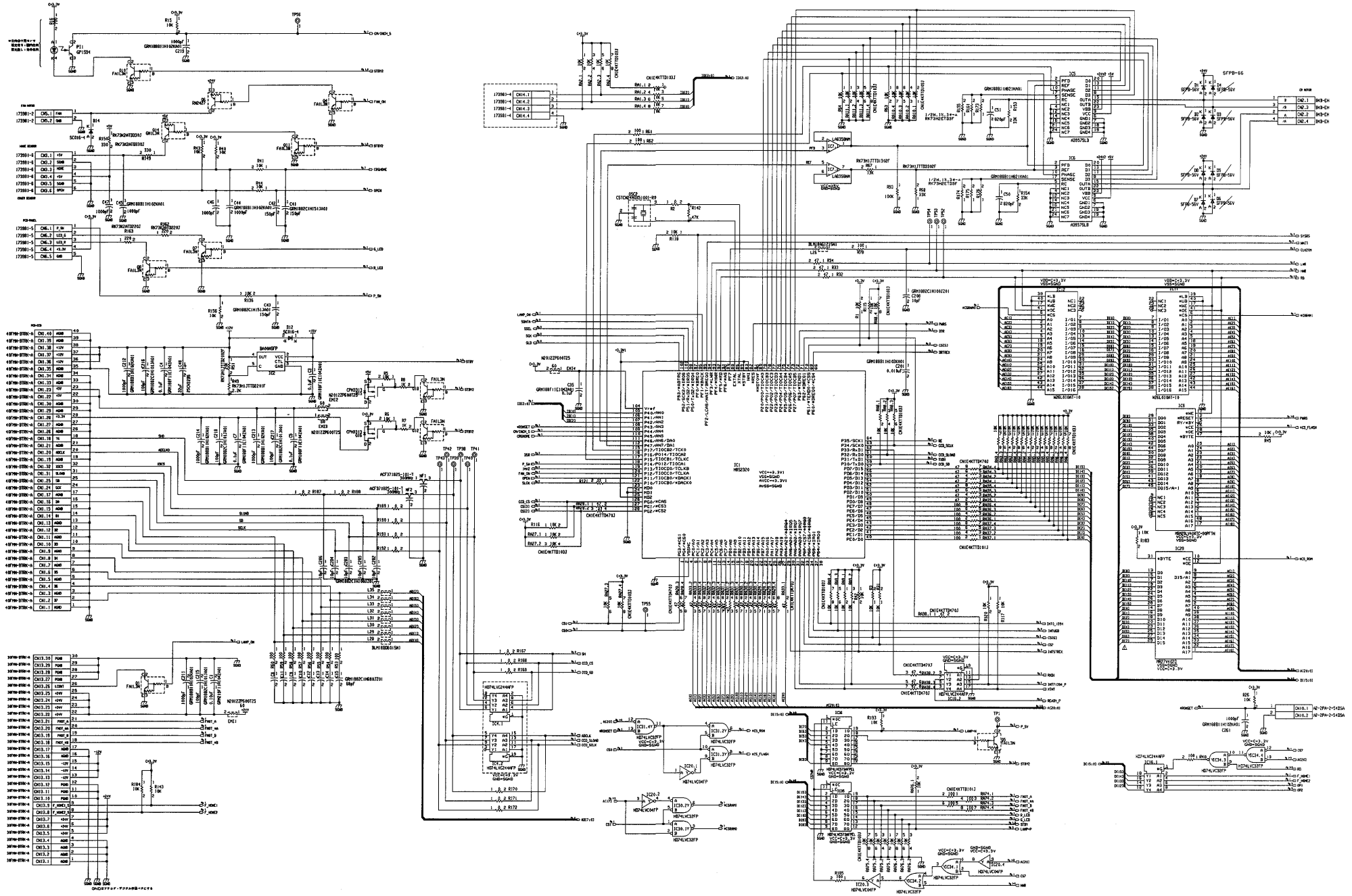


Figure 7-1. Connection Diagram

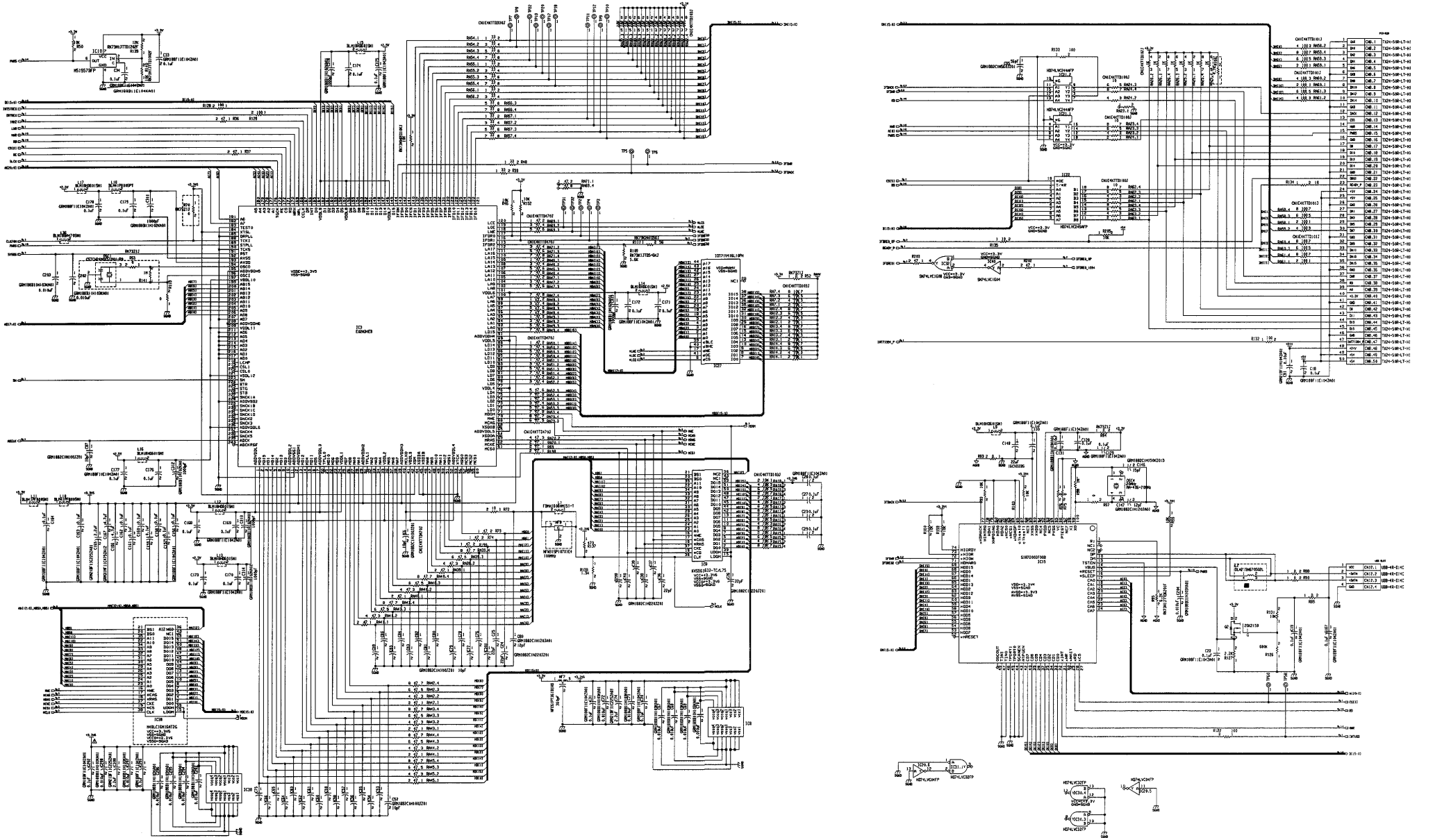
7.2 Circuit Diagrams

The control electrical circuit diagrams of this product are shown on the following pages.

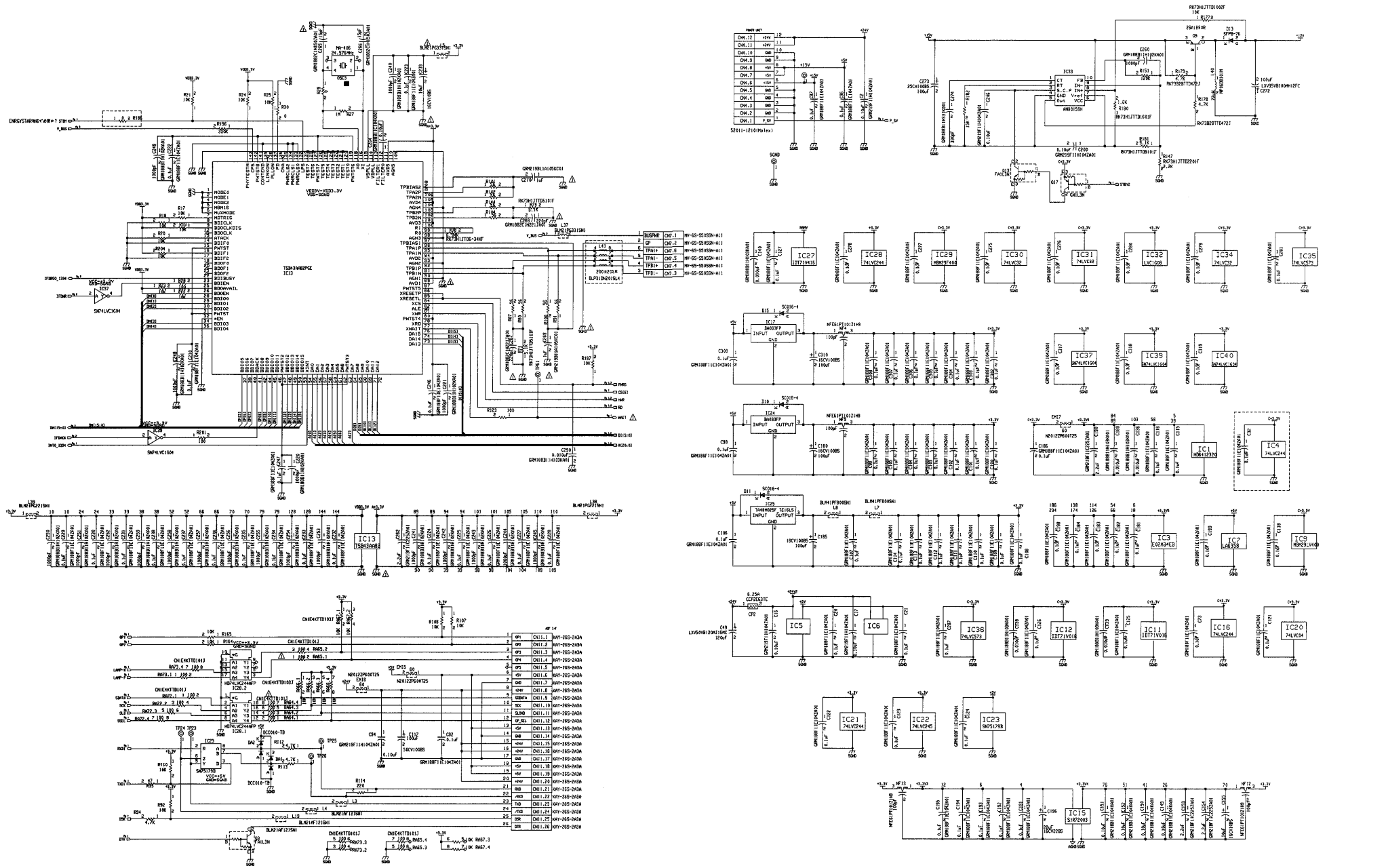
- ☐ Main Board
- ☐ Sub Board
- ☐ Power Supply Board
- ☐ Inverter Board
- ☐ CCD Sensor Board
- ☐ Panel Board
- ☐ TPU Main Board



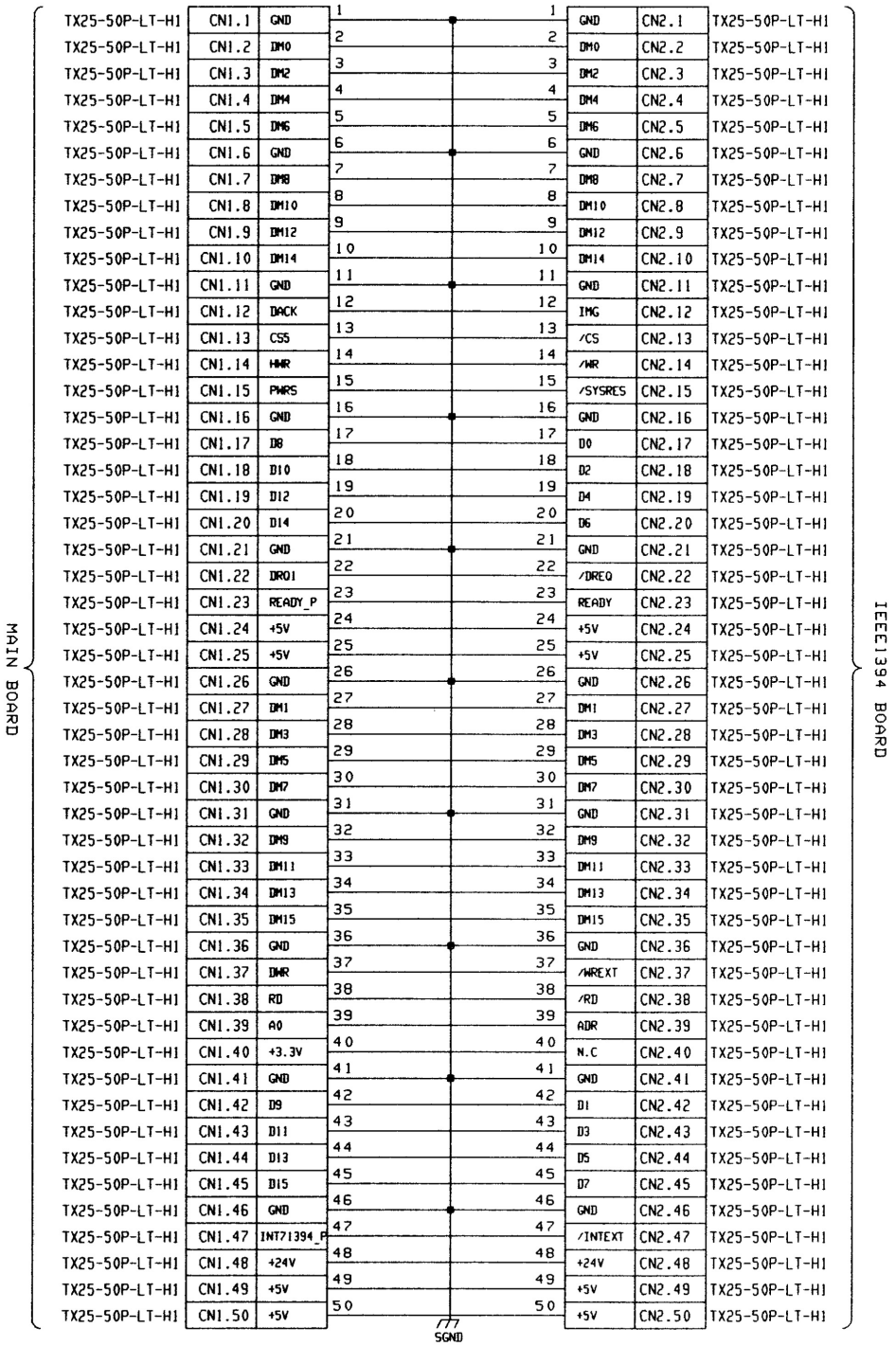
Main Board (1)



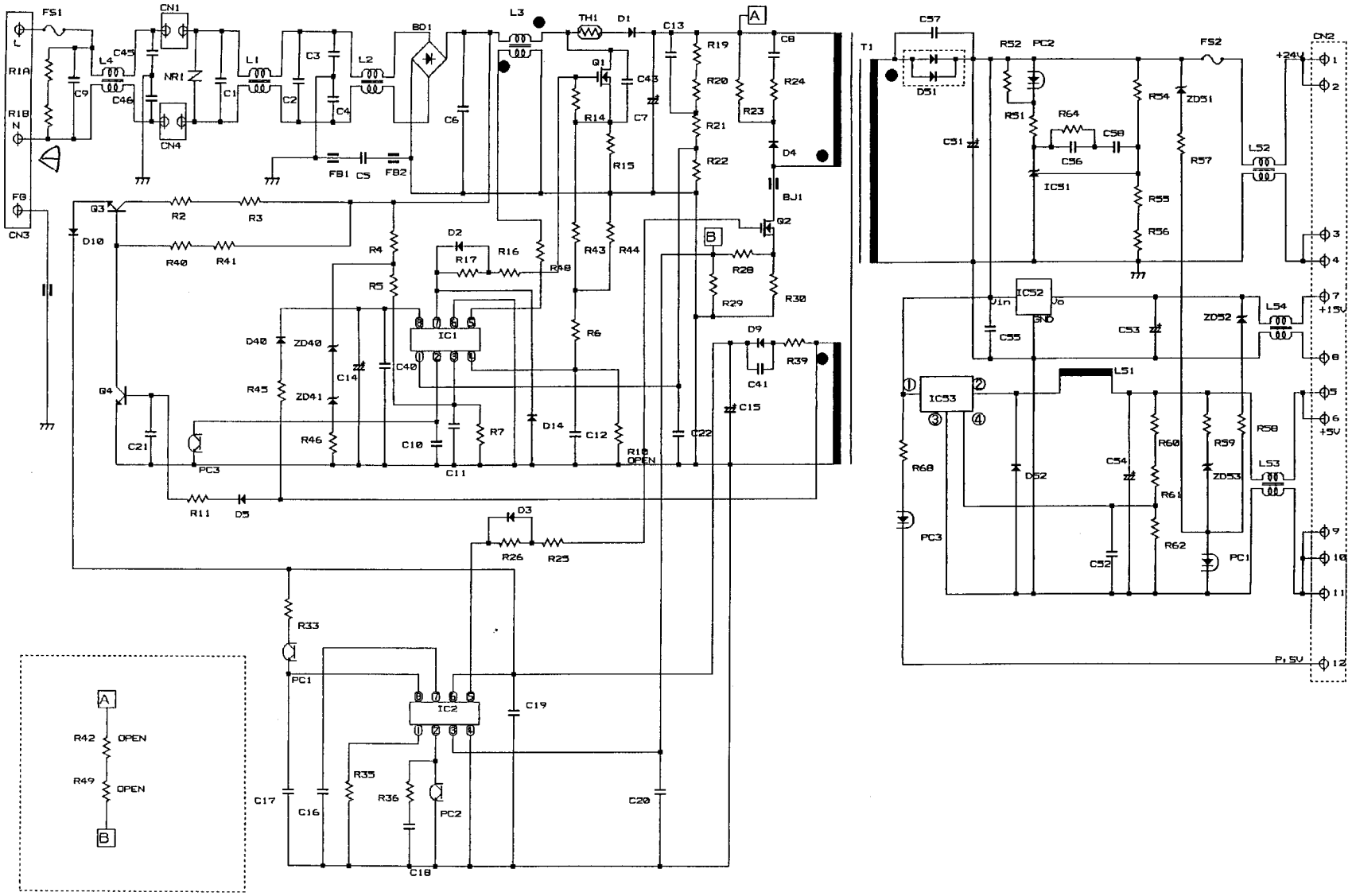
Main Board (2)



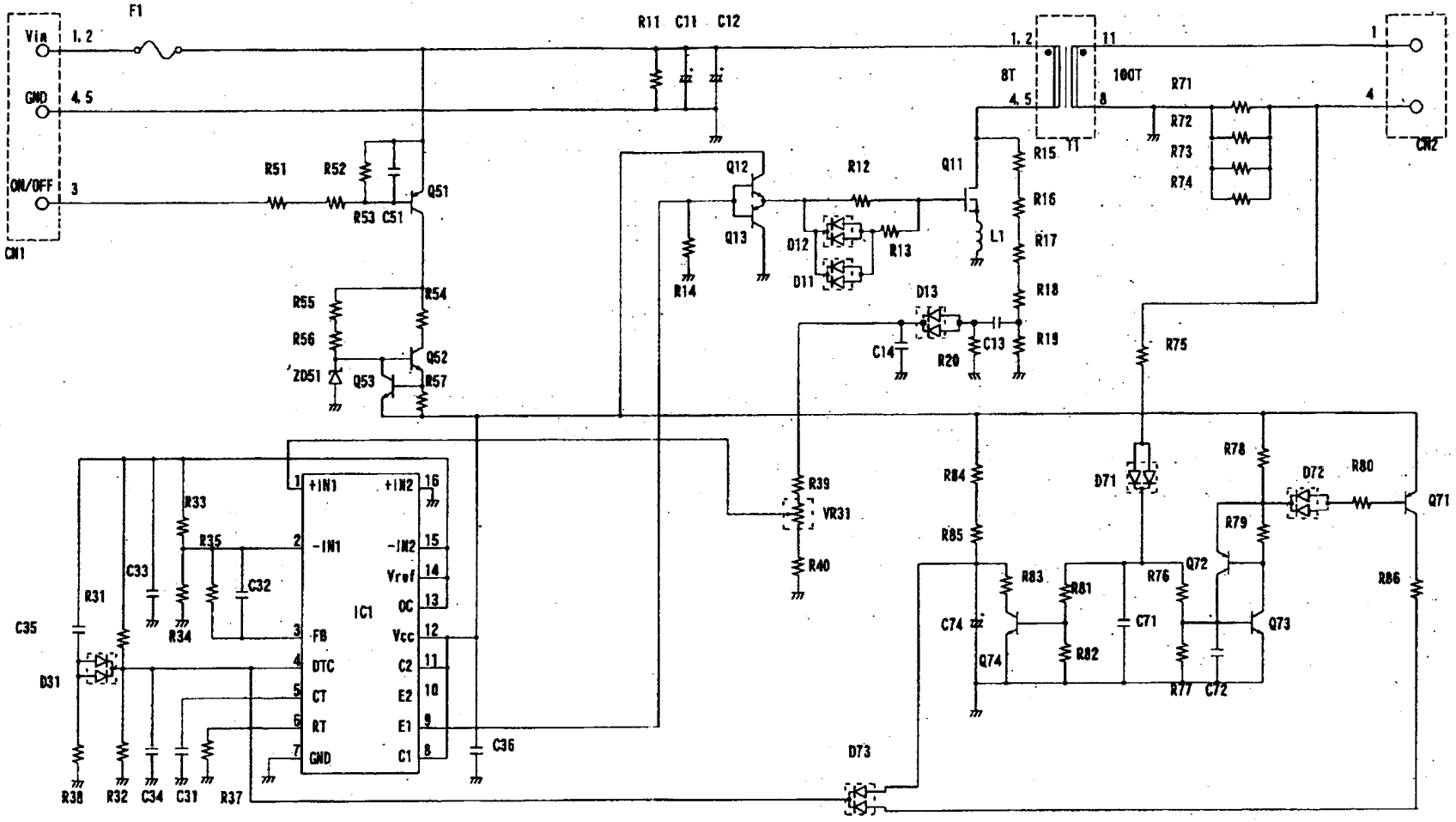
Main Board (3)


MAIN BOARD
IEEE1394 BOARD
TX25-50P-LT-H1
CN1.1 GND
CN1.2 DM0
CN1.3 DM2
CN1.4 DM4
CN1.5 DM6
CN1.6 GND
CN1.7 DM8
CN1.8 DM10
CN1.9 DM12
CN1.10 DM14
CN1.11 GND
CN1.12 BACK
CN1.13 CS5
CN1.14 HWR
CN1.15 PWRS
CN1.16 GND
CN1.17 D8
CN1.18 D10
CN1.19 D12
CN1.20 D14
CN1.21 GND
CN1.22 DRQ1
CN1.23 READY_P
CN1.24 +5V
CN1.25 +5V
CN1.26 GND
CN1.27 DM1
CN1.28 DM3
CN1.29 DM5
CN1.30 DM7
CN1.31 GND
CN1.32 DM9
CN1.33 DM11
CN1.34 DM13
CN1.35 DM15
CN1.36 GND
CN1.37 DWR
CN1.38 RD
CN1.39 A0
CN1.40 +3.3V
CN1.41 GND
CN1.42 D9
CN1.43 D11
CN1.44 D13
CN1.45 D15
CN1.46 GND
CN1.47 INT71394_P
CN1.48 +24V
CN1.49 +5V
CN1.50 +5V
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
SGND
GND CN2.1
DM0 CN2.2
DM2 CN2.3
DM4 CN2.4
DM6 CN2.5
GND CN2.6
DM8 CN2.7
DM10 CN2.8
DM12 CN2.9
DM14 CN2.10
GND CN2.11
IMG CN2.12
/CS CN2.13
/WR CN2.14
/SYSRES CN2.15
GND CN2.16
D0 CN2.17
D2 CN2.18
D4 CN2.19
D6 CN2.20
GND CN2.21
/DREQ CN2.22
READY CN2.23
+5V CN2.24
+5V CN2.25
GND CN2.26
DM1 CN2.27
DM3 CN2.28
DM5 CN2.29
DM7 CN2.30
GND CN2.31
DM9 CN2.32
DM11 CN2.33
DM13 CN2.34
DM15 CN2.35
GND CN2.36
/WREXT CN2.37
/RD CN2.38
ADR CN2.39
N.C CN2.40
GND CN2.41
D1 CN2.42
D3 CN2.43
D5 CN2.44
D7 CN2.45
GND CN2.46
/INTEXT CN2.47
+24V CN2.48
+5V CN2.49
+5V CN2.50
TX25-50P-LT-H1

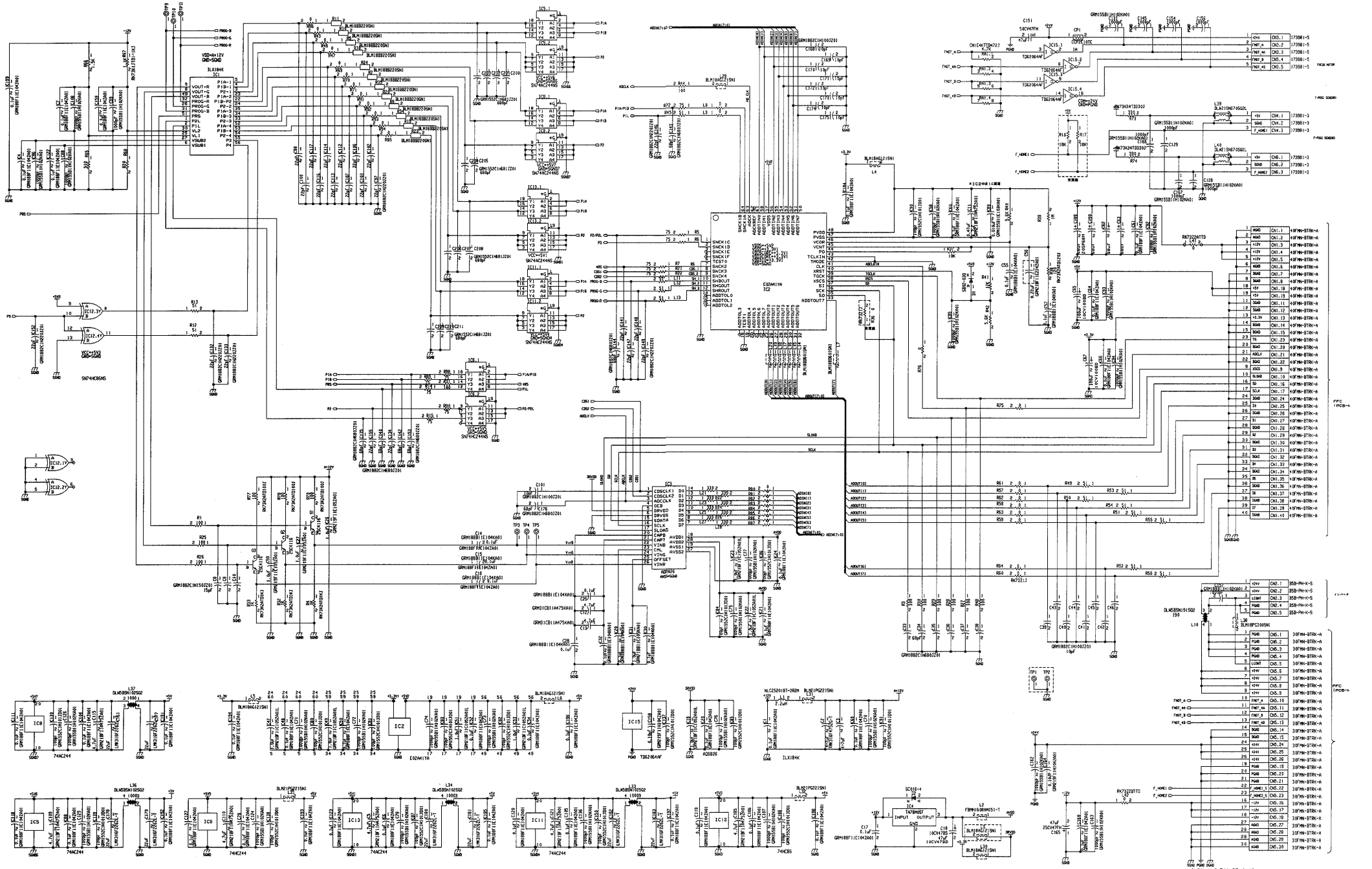
SUB Board



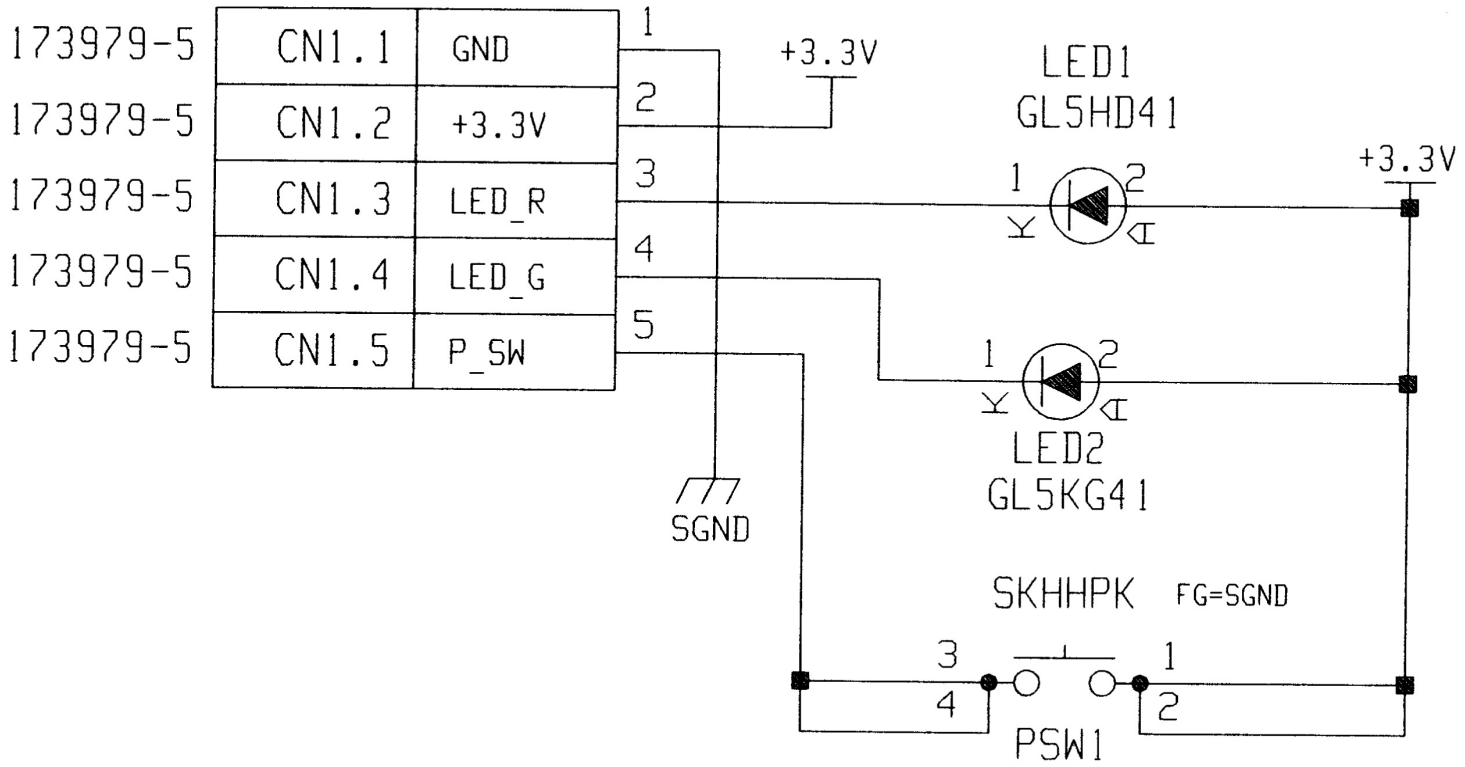
Power Supply Board



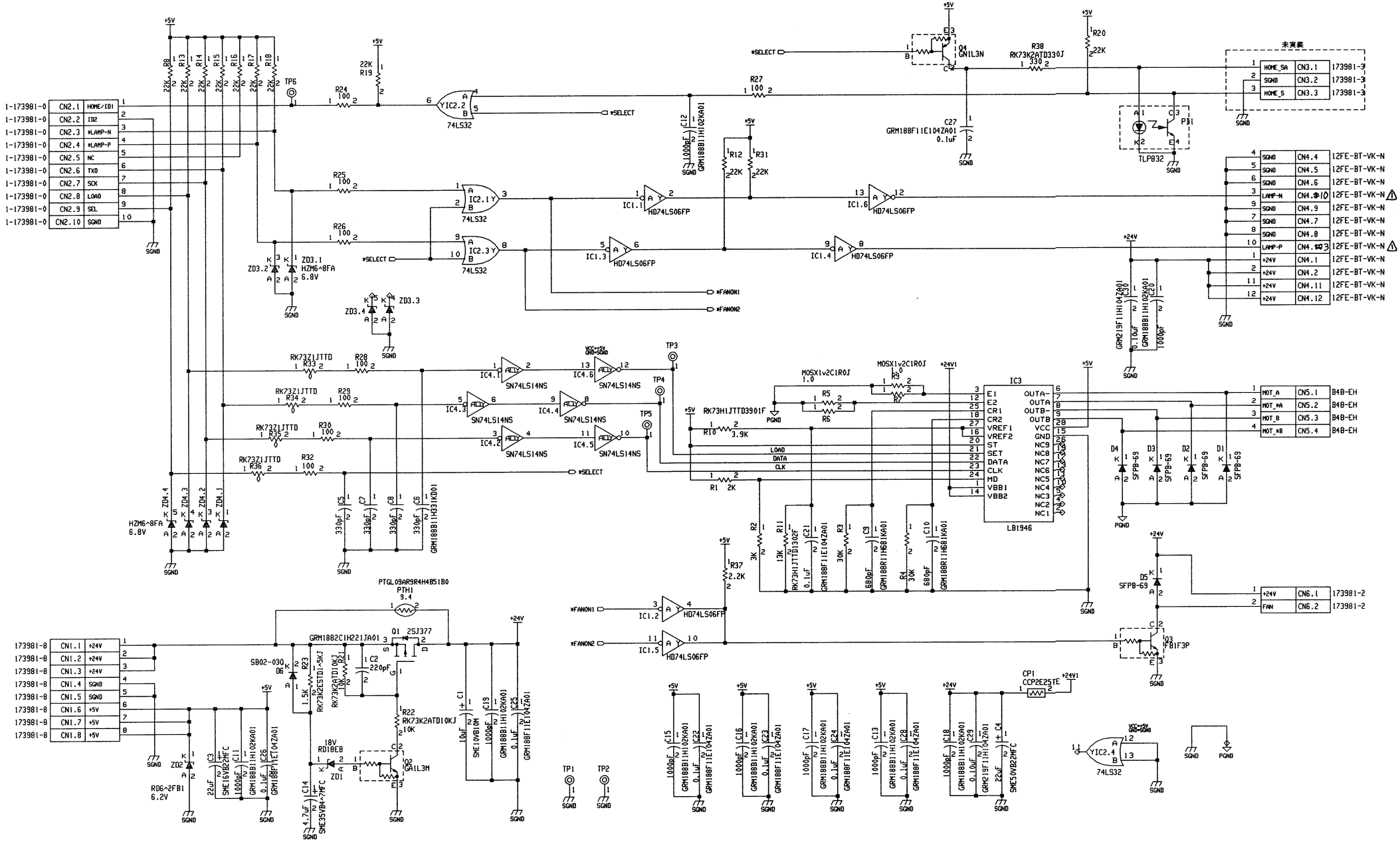
Inverter Board



CCD Sensor Board

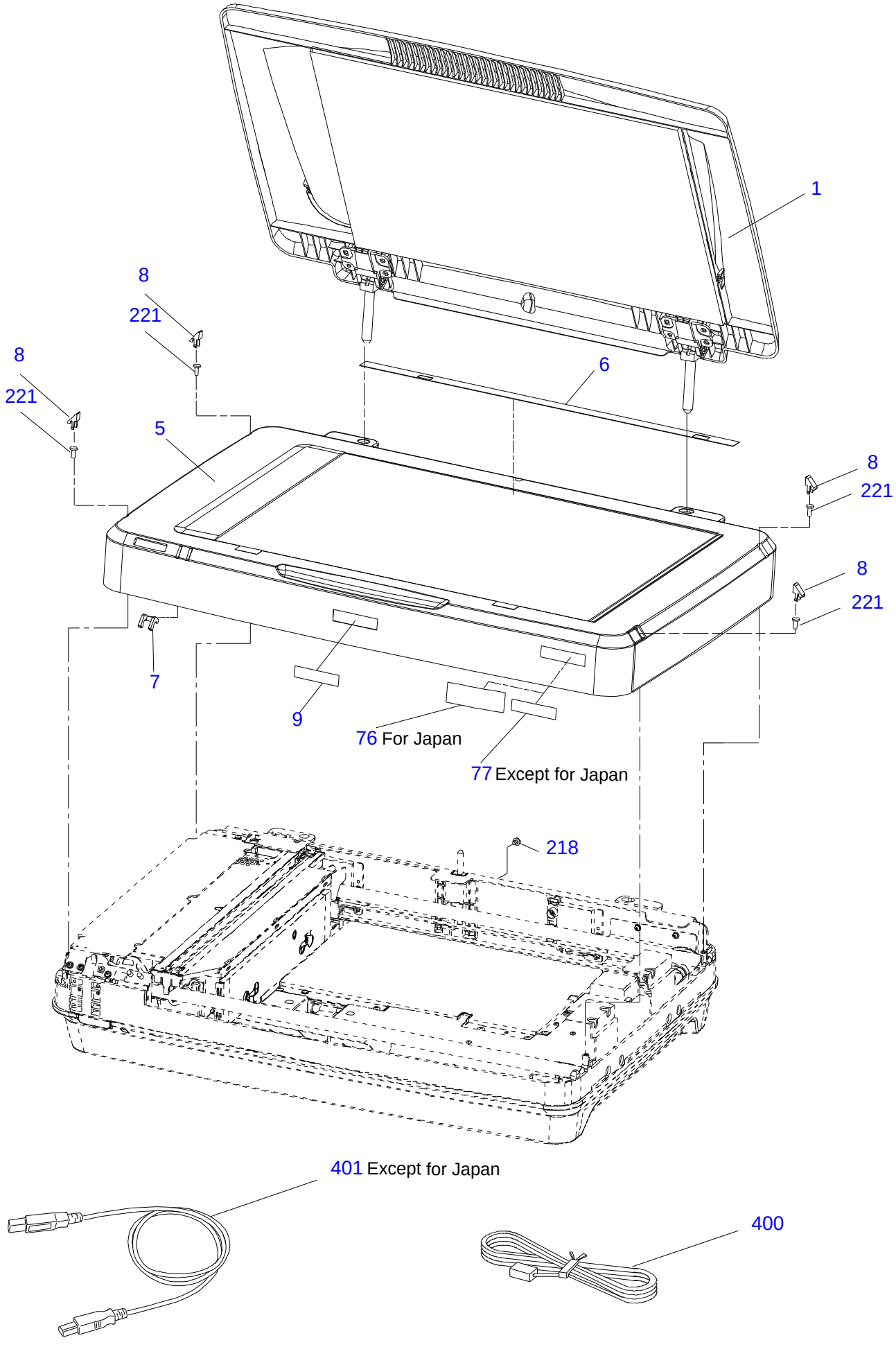

173979-5
CN1.1
GND
1
173979-5
CN1.2
+3.3V
2
173979-5
CN1.3
LED_R
3
173979-5
CN1.4
LED_G
4
173979-5
CN1.5
P_SW
5
+3.3V
SGND
LED1
GL5HD41
1
2
+3.3V
LED2
GL5KG41
SKHHPK
FG=SGND
3
4
1
2
PSW1

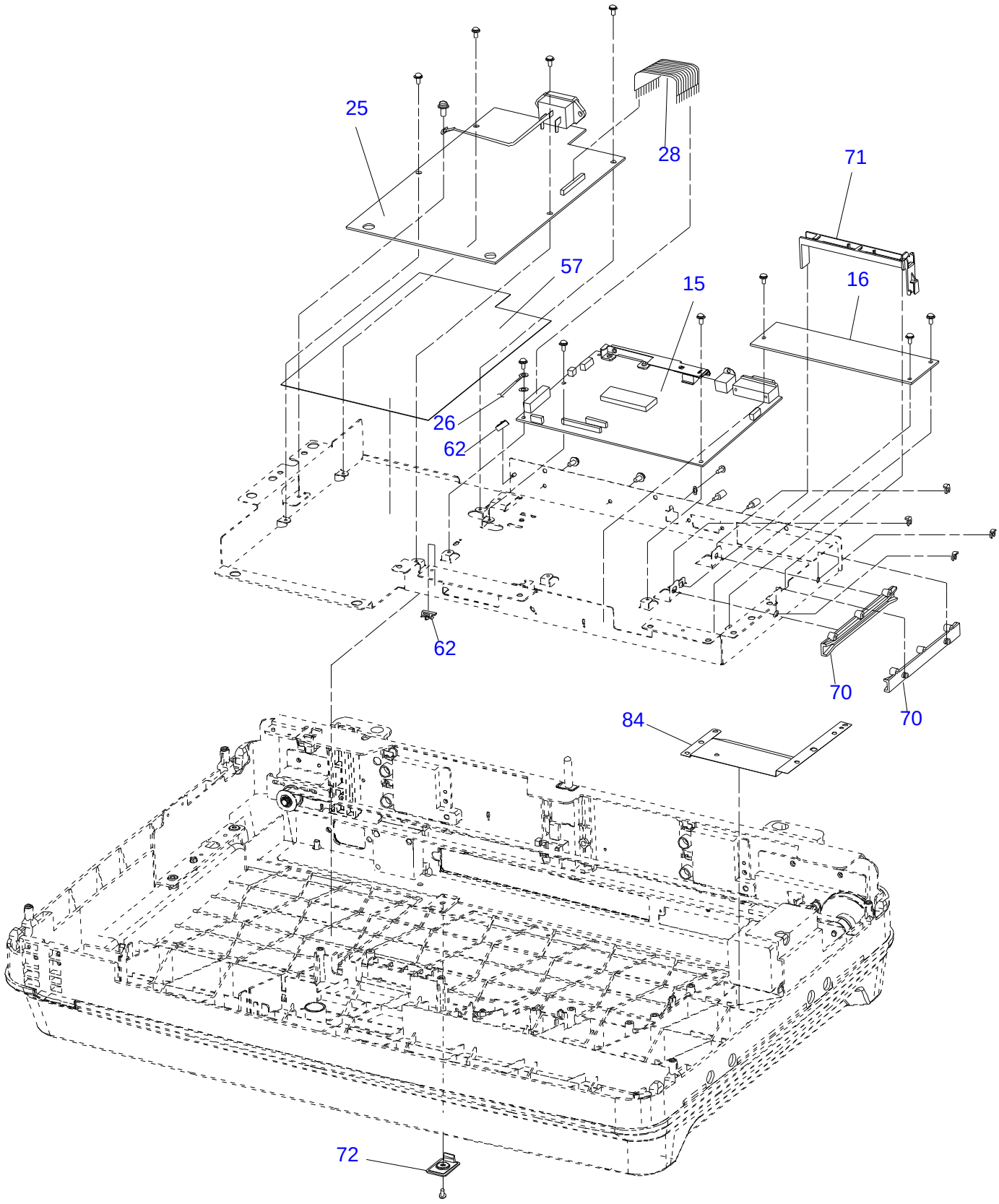
Panel Board

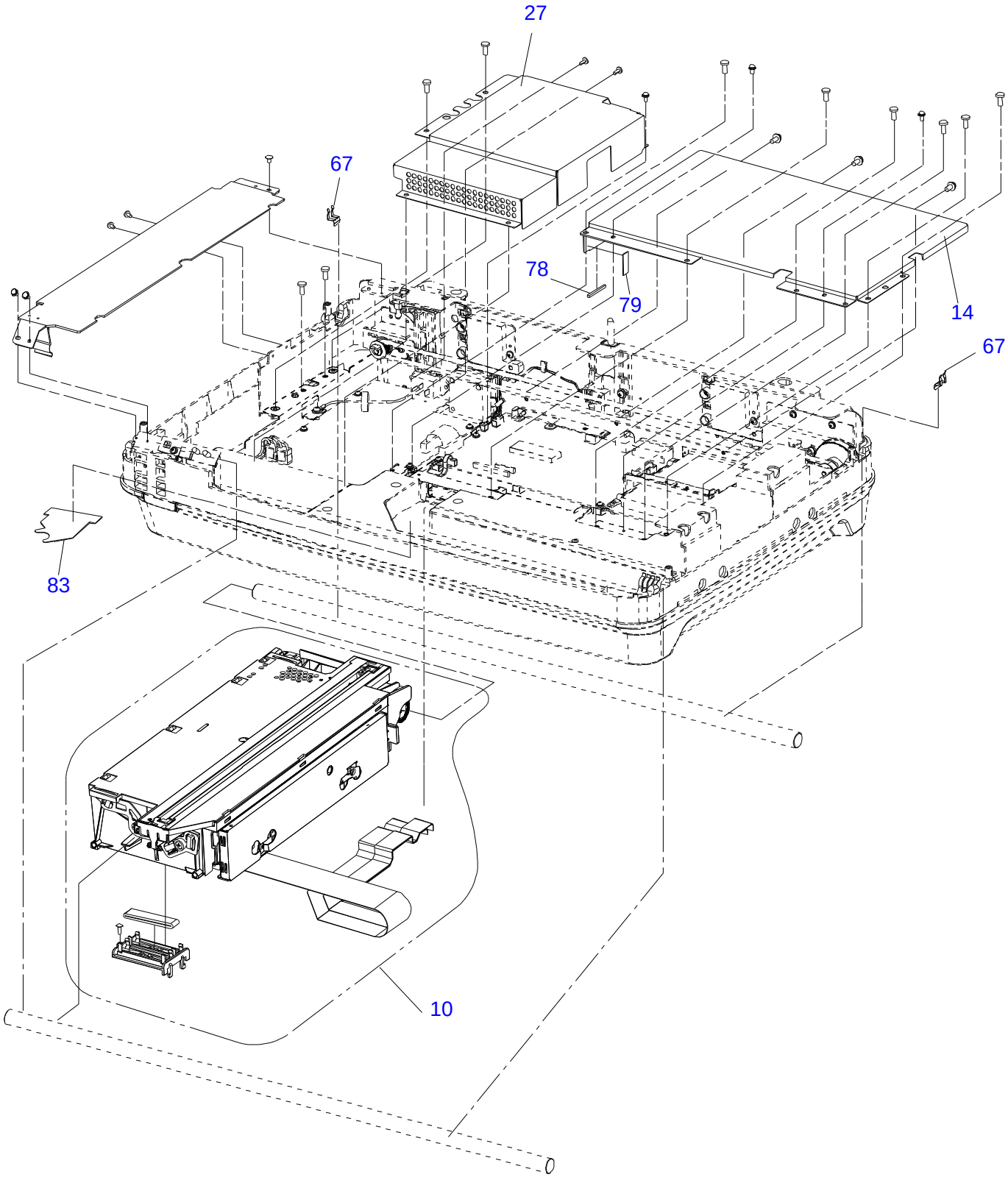

TPU Main Board

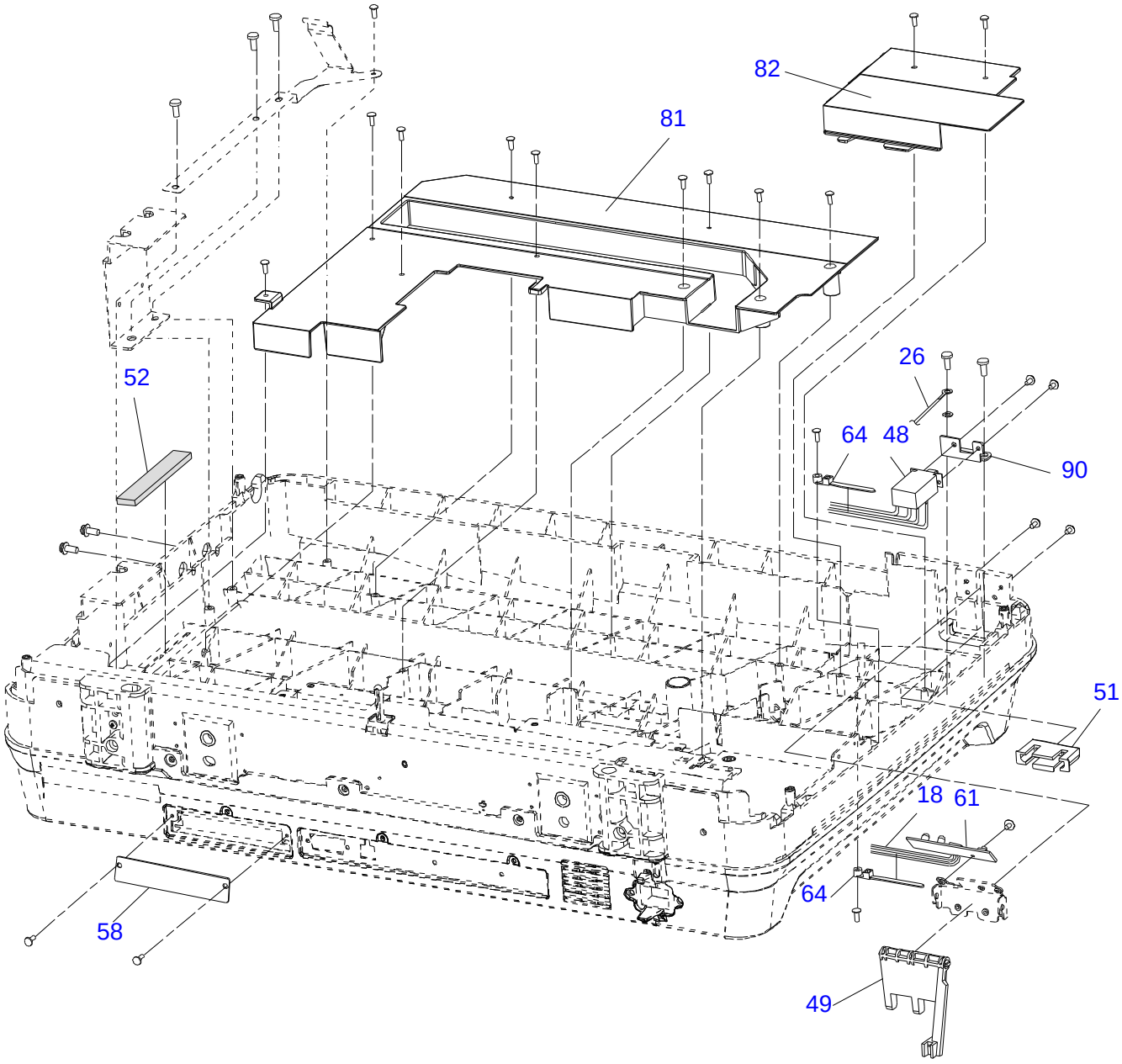
7.3 Exploded Diagrams

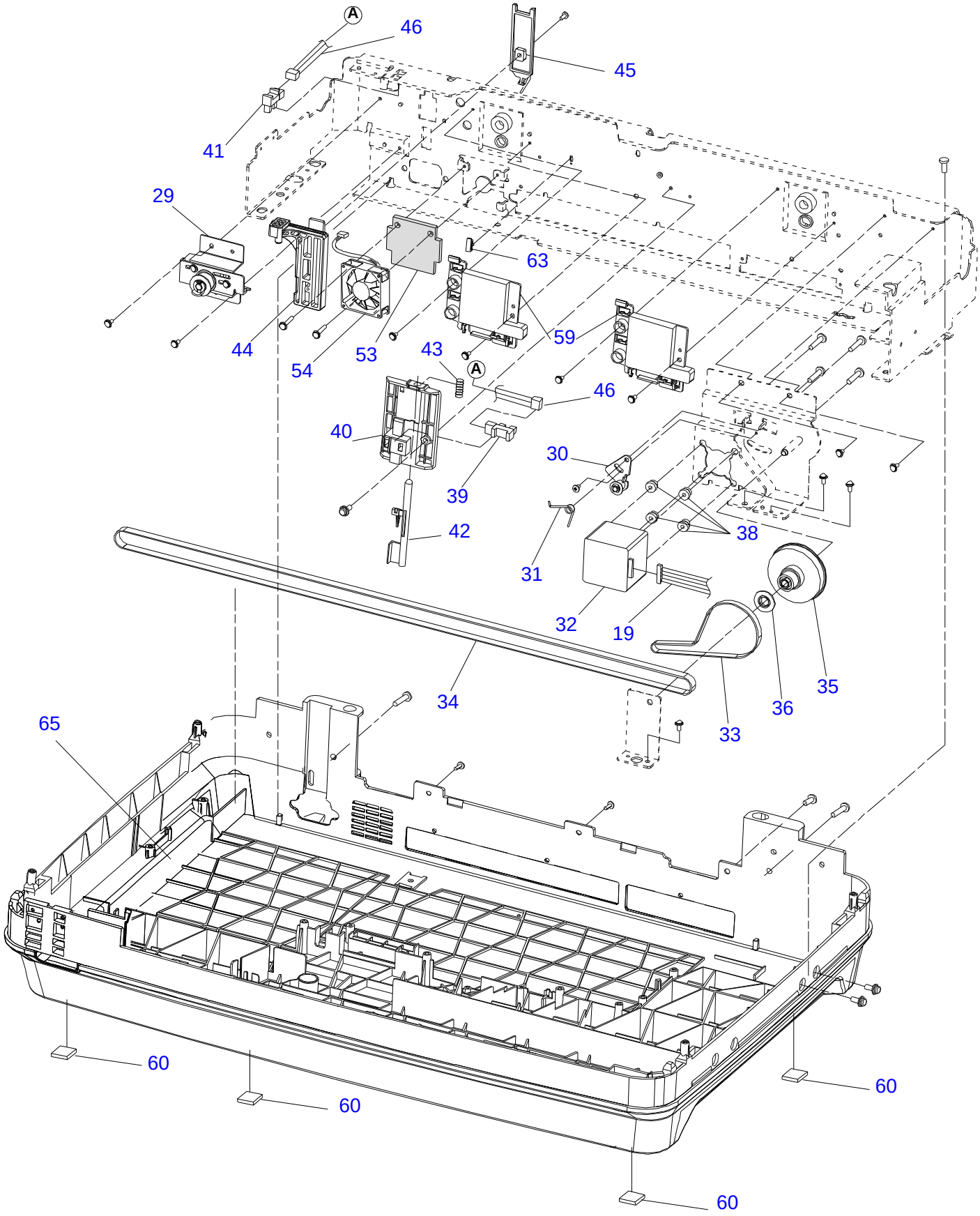
The Exploded Diagrams are shown on the following pages.


1
8
221
8
221
6
5
8
221
8
221
7
9
76 For Japan
77 Except for Japan
218
401 Except for Japan
400


25
28
71
57
15
16
26
62
62
70
70
84
72


27
67
78
79
14
67
83
10


82
81
52
26
64
48
90
51
18
61
64
58
49



ES-10000G / Expression 10000XL No.5 Rev.02 B168-MECH-0032

7.4 Parts List

Table 7-1. Main Parts List

Ref No.	Part Name
NON FIG	APPLICATION CD-ROM,J
NON FIG	CD-ROM SOFTWARE
NON FIG	USER'S GUIDE
1	ASY-CVR-PLATEN-39
221	SCR040120FDBB
400	AC CABLE
5	ASY-CVR-UP-39
6	GID-SET-SUB-39
7	GID-OPT
76	LABEL, MODEL NAME
8	CVR-SCR-UPPER-39
9	SEL-PLT-LOGO-39
15	PBA-MAIN
16	PBA-SUB
25	PWS-DU2L3B158
10	ASY-CRG
14	BOX-BRD-UP
18	ASM-PANEL
19	ASM-MOT
26	ASM-FG
27	ASY-BOX-PS-39
28	CBP-POWER
29	ASY-TEN-L
30	ASY-TEN-D
31	SP-TEN-MOT
32	MOT-17PY-Z002-ASSY
33	BELTST1027060
34	BELTS5580080
35	PLY-ST1162ST5536
36	FNLG-S

Table 7-1. Main Parts List

Ref No.	Part Name
38	SCR-DMPR-CR
39	BKT-MOT
40	HLDR-CDS
41	TLP1241(C5)
42	LVR-CDS
43	SP-TEN-CDS
44	CRG-LOCK-39
45	CRG-LOCK-LVR-39
46	ASM-SENS
48	ASM-ACLINE
49	ARM-SW
51	SW-PS
52	FLTR-IN
53	FLTR-OUT
54	FAN-1606KL-05W-B30
57	SHT-PS-LO
58	GUIDE-RAIL
59	CVR-MOUNT
60	LEG-16*16*3
61	PBA-PANEL
62	RLMC-05T V0
63	RLMC-01T V0
64	T18MR
64	T18MR
65	CVR-LOWER-39
70	GUIDE-RAIL
72	CVR-SENSOR-39
78	STG-5-5-68
79	STG-2-12-25
80	HLDR-CORE-L
81	CVR-BOX-LO-R
82	CVR-BOX-LO-L
83	SHT-CVR-LO-S